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ADDITIONAL REPORT ON CALANOID COPEPODS FROM THE IZU REGION. PART 1. *EUCHAETA* AND *PAEUCHAETA*

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With 22 Text-figures

The present report deals with a part of the large collection of zooplankton obtained by the R/V **Tansei Maru** of the Ocean Research Institute, University of Tokyo, from the Izu region covering Sagami and Suruga Bays and their southern waters. Samples were collected in October and November, 1964, and March and April, 1965, by oblique tow at a ship's speed of 2 knots with ORI-C net (OMORI, 1965). The sampling positions, depth, and date are listed in Appendix-table. The actual depth sampled was determined by TS depth-distance recorder. Usually, a quarter or one-eighth of the original sample was sorted for identification.

Regarding Euchaetidae from Japanese waters, TANAKA (1958) has recorded occurrences of 8 species of *Euchaeta*, namely, *concinna*, *longicornis*, *marina*, *media*, *plana*, *pubela*, *spinosa*, and *wolfendeni*, and 16 species of *Pareuchaeta*, namely, *aequatorialis*,

Table 1. List of species.

<i>Euchaeta</i>	
1. <i>concinna</i> DANA	17. <i>hanseni</i> (WITH)
2. <i>longicornis</i> GIESBRECHT	18. <i>investigatoris</i> SEWELL
3. <i>marina</i> (PRESTANDREA)	19. <i>laudabilis</i> sp. nov.
4. <i>media</i> GIESBRECHT	20. <i>malayensis</i> SEWELL
5. <i>plana</i> MORI	21. <i>pavlovskii</i> BRODSKY
6. <i>spinosa</i> GIESBRECHT	22. <i>polita</i> sp. nov.
7. <i>wolfendeni</i> A. SCOTT	23. <i>prudens</i> sp. nov.
<i>Pareuchaeta</i>	
8. <i>aequatorialis</i> TANAKA	24. <i>rubra</i> BRODSKY
9. <i>barbata</i> (BRADY)	25. <i>russelli</i> (FARRAN)
10. <i>birostrata</i> BRODSKY	26. <i>sarsi</i> (FARRAN)
11. <i>bisinuata</i> SARS	27. <i>scaphula</i> (FONTAINE)
12. <i>californica</i> (ESTERLY)	28. <i>scotti</i> (FARRAN)
13. <i>confusa</i> TANAKA	29. <i>simplex</i> TANAKA
14. <i>dubia</i> (ESTERLY)	30. <i>simulantis</i> sp. nov.
15. <i>elongata</i> (ESTERLY)	31. ? <i>solida</i> (ESTERLY)
16. <i>eminens</i> sp. nov.	32. <i>striata</i> sp. nov.
	33. <i>withi</i> SEWELL

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barbata, birostrata, bisinuata, calva, comosa, confusa, crassa, elongata, hanseni, malayensis, russelli, sarsi, scotti, simplex, and tonsa. KITOU found additional 2 species, P. rubra and P. pseudotumidula from deep layers of the Japan Trench (FURUHASHI, 1965). In the present study, total 33 species of Euchaetidae including 6 new species were identified (Table 1). Besides descriptions of the new species, redescription and revision were given for some species. The whole material is kept in the Ocean Research Institute, University of Tokyo.

The authors wish to thank Prof. Ryuzo MARUMO for his cooperation during the course of study.

EUCHAETA PHILIPPI, 1843

Euchaeta concinna DANA, 1849

Euchaeta concinna, GIESBRECHT, 1892, p. 246, pl. 15, fig. 32, pl. 16, figs. 19, 40, pl. 37, figs. 51, 53; A. SCOTT, 1909, p. 65, pl. 19, figs. 21–27; SEWELL, 1929, p. 146; FARRAN, 1936, p. 90; MORI, 1937, p. 45, pl. 20, figs. 1–5; WILSON, 1950, p. 212, pl. 8, figs. 72, 73, pl. 22, fig. 326; TANAKA, 1958, p. 328.

Occurrence: St. 84–2, 1 ♀; St. 94, 2 ♀; St. 95, 1 ♀; St. 96, 1 ♂; St. 97–2, 2 ♀.

Remarks: Female, 2.99–3.30 mm; male, 2.52 mm. This warm water species is widely distributed in the Indo-Pacific waters, but is not very common in Japanese waters. In the present study it was found only in October. MORI (1937) recorded a single female specimen near Hachijo Island in summer. A. SCOTT (1909) reported that the species was well distributed throughout the area investigated by *Siboga*. In the Indian Ocean it is one of the most common copepods (SEWELL, 1929).

Euchaeta longicornis GIESBRECHT, 1888

Euchaeta longicornis, GIESBRECHT, 1892, p. 246, pl. 16, figs. 35, 37, pl. 37, figs. 45, 46; A. SCOTT, 1909, p. 66; MORI, 1937, p. 45, pl. 18, figs. 10–14; WILSON, 1950, p. 212, pl. 8, figs. 79–83; TANAKA, 1958, p. 328.

Occurrence: St. 83, 5 ♀, 2 ♂; St. 114, 1 ♀.

Remarks: Female, 3.09 mm; male, 2.91 mm. The species is widely distributed in the Indo-Pacific. It has been recorded from the Malay region (A. SCOTT, 1909), off New Zealand (FARRAN, 1929), the East China Sea and off southern Japan (MORI, 1937), the southeastern Pacific (WILSON, 1950), and the Izu region (TANAKA, 1958).

Euchaeta marina (PRESTANDREA, 1833)

Euchaeta marina, GIESBRECHT, 1892, p. 245, pl. 1, figs. 10, 11, pl. 15, figs. 31, 33, pl. 16, figs. 15–17, 22, 23, 25, 29, 30, 41, 46, pl. 37, figs. 30, 37, 38, 49; A. SCOTT, 1909, p. 67, pl. 19, figs. 9–20; MORI, 1937, p. 43, pl. 19, figs. 1–8; SEWELL, 1947, p. 113, fig. 25, a-d; TANAKA, 1958, p. 328;

GRICE, 1962, p. 199, pl. 13, fig. 1; VERVOORT, 1963, p. 158; CRISAFI, 1965, p. 263, figs. 1-25; OWRE and FOYO, 1967, p. 55, figs. 327-335.

Occurrence: St. 83, 23 ♀; St. 84-2, 19 ♀, 4 ♂; St. 93-1, 14 ♀, 2 ♂; St. 93-2, 8 ♀, 2 ♂; St. 94, 6 ♀, 7 ♂; St. 95, 9 ♀, 1 ♂; St. 96, 81 ♀, 13 ♂; St. 97-2, 126 ♀, 31 ♂; St. 98, 10 ♀, 5 ♂; St. 113, 1 ♀; St. 114, 12 ♀, 2 ♂; St. 117-2, 1 ♀; St. 118, 1 ♀; St. 120, 1 ♀; St. 121-1, 6 ♀, 2 ♂; St. 122, 5 ♀, 1 ♂.

Remarks: Female, 3.45-4.02 mm; male, 3.30-3.86 mm. The species has a very wide geographical distribution. It is epiplanktonic in character, but has a considerable range of vertical distribution. The species occurs frequently in the surface layer in the Izu region and is especially abundant in the area such as Sts. 96 and 97 where the main axis of the Kuroshio runs. Forty-two specimens out of 395 females were ovigerous.

Euchaeta media GIESBRECHT, 1888

Euchaeta media, GIESBRECHT, 1892, p. 246, pl. 16, figs. 13, 36, pl. 37, figs. 39, 40; A. SCOTT, 1909, p. 66; MORI, 1937, p. 46, pl. 19, figs. 9-13; WILSON, 1950, p. 214, pl. 22, figs. 323-325; TANAKA, 1958, p. 330; GRICE, 1962, p. 201, pl. 13, figs. 10-14; VERVOORT, 1963, p. 161; OWRE and FOYO, 1967, p. 54, figs. 336-338.

Occurrence: St. 83, 5 ♀; St. 84-2, 29 ♀, 6 ♂; St. 93-1, 2 ♀; St. 93-2, 3 ♀, 1 ♂; St. 94, 1 ♀; St. 95, 7 ♀; St. 96, 8 ♀, 2 ♂; St. 97-2, 1 ♀; St. 98, 1 ♀; St. 108, 11 ♀, 1 ♂; St. 109, 7 ♀, 1 ♂; St. 110, 3 ♀; St. 111-1, 8 ♀, 1 ♂; St. 111-2, 1 ♀; St. 112, 1 ♀; St. 113, 1 ♀; St. 114, 3 ♀, 2 ♂; St. 115-1, 34 ♀, 4 ♂; St. 115-2, 10 ♀, 7 ♂; St. 116, 7 ♀, 9 ♂; St. 117-1, 3 ♀, 3 ♂; St. 117-2, 6 ♀, 6 ♂; St. 118, 3 ♀, 1 ♂; St. 119, 5 ♀; St. 120, 7 ♀, 1 ♂; St. 121-1, 3 ♀; St. 121-2, 3 ♀; St. 122, 2 ♀.

Remarks: Female, 4.12-4.64 mm; male, 3.61-3.86 mm. The species occurred in almost all the stations investigated. It appears to be distributed abundantly in the layers between the surface and 200 m depth in the Izu region. The species has been recorded from the San Diego region (ESTERLY, 1905), the Great Barrier Reef (FARRAN, 1936), the Arabian Sea (SEWELL, 1947), the East China Sea (MORI, 1937), the Central Pacific (GRICE, 1962), and the Gulf of Guinea (VERVOORT, 1963). The present Izu specimens were much larger in size than those recorded elsewhere.

Euchaeta plana MORI, 1937

(Fig. 1, A-K; Fig. 2, A-D)

Euchaeta plana MORI, 1937, p. 46, pl. 21, figs. 1-8; TANAKA, 1958, p. 329, fig. 62, a-g.
Euchaeta murrayi SEWELL, 1947, p. 117, fig. 26, a-i.

Occurrence: St. 84-2, 1 ♂; St. 93-1, 1 ♂; St. 93-2, 1 ♀, 2 ♂; St. 94, 1 ♀; St. 95, 1 ♀; St. 110, 1 ♂.

Descriptive notes: *E. plana* has been found from Japanese waters (MORI, 1937). SEWELL (1947) described *E. murrayi* taken from the Arabian Sea. On closer examina-

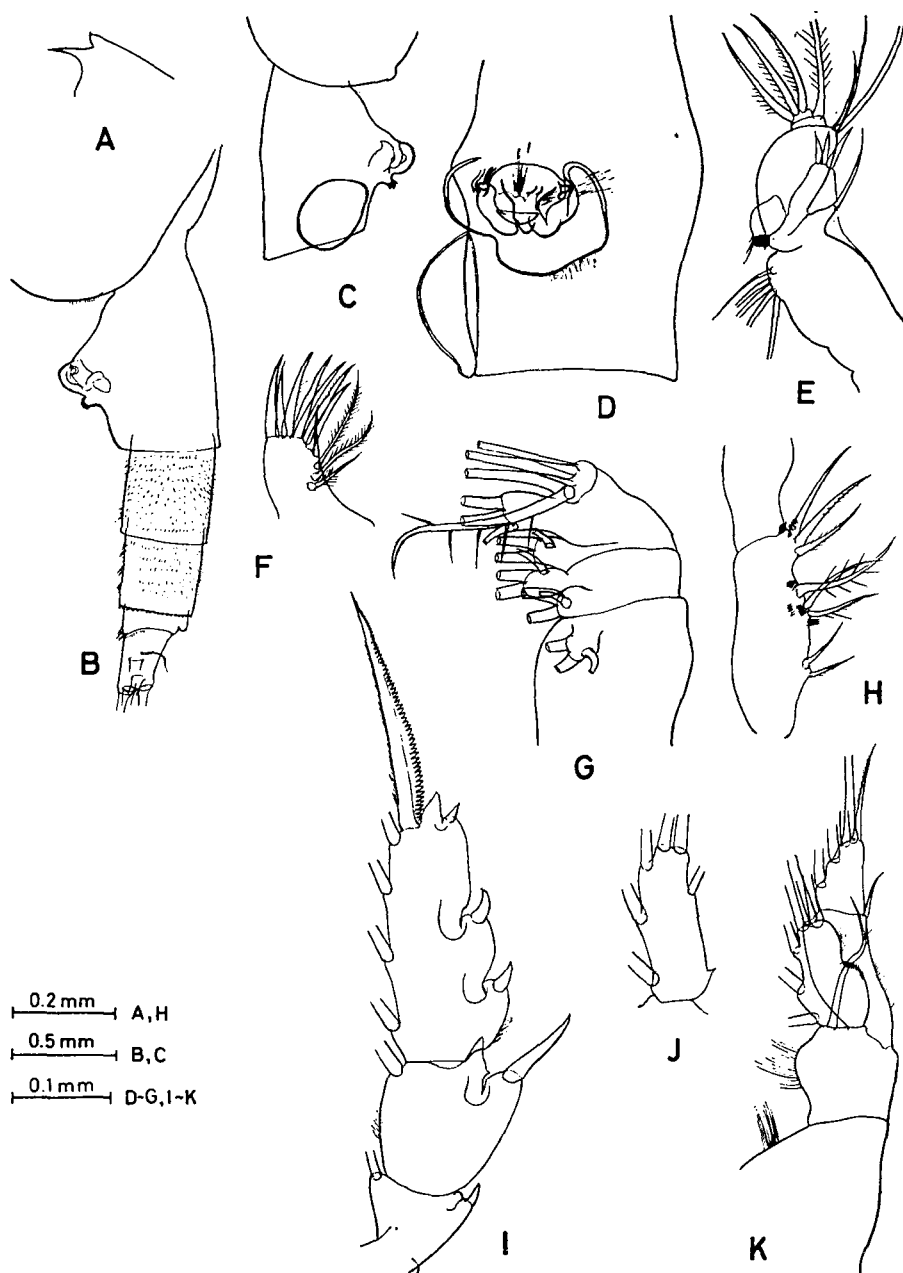


Fig. 1. *Euchaeta plana* MORI, female (length, 2.90 mm): A, head, lateral view; B, last thoracic segment and abdomen, left lateral side; C, last thoracic segment and genital segment, right lateral side; D, genital segment, ventral view; E, 1st maxilla; F, 1st inner lobe of 1st maxilla; G, 2nd maxilla; H, maxilliped; I, exopod of 2nd leg; J, endopod of 2nd leg; K, 1st leg.

In the 1st maxilla the outer lobe has 5 long setae: the endopod carries 4 setae in all: the 2nd basal segment has 3 setae: the 1st inner lobe has 11 setae: the 2nd inner lobe has a single seta: the 3rd inner lobe absent: the exopod has 11 setae. In the 2nd maxilla the endopod has a characteristic spine furnished with lateral spinules.

In a large specimen measuring 3.24 mm the abdominal segments and furca are in the following proportional lengths:

segment	1-2	3	4	5	furca	
	45	21	18	4	12	=100

The genital aperture is just as in the small specimen.

The 1st antenna has the segments in the following proportional lengths:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	72	38	19	19	21	25	27	34	19	19	28	36	38	47
segment	16	17	18	19	20	21	22	23	24-25					
	55	53	55	69	69	62	62	55	77	=1000				

Remarks: The species has been reported from the East China Sea and Formosan Strait (MORI, 1937), from the Arabian Sea and the Gulf of Oman (SEWELL, 1947), and from the Izu region (TANAKA, 1958).

Euchaeta spinosa GIESBRECHT, 1892

Euchaeta spinosa GIESBRECHT, 1892, p. 246, pl. 16, figs. 12, 26, 34, 47, pl. 37, figs. 31, 34, 35, 50; ESTERLY, 1905, p. 159, fig. 24; SARS, 1925, p. 104, pl. 30, figs. 1-6; WILSON, 1932, p. 62, fig. 41; TANAKA, 1958, p. 332, fig. 64, a-f; GRICE, 1962, p. 203, pl. 14, figs. 21-23; VERVOORT, 1963, p. 162; OWRE and FOYO, 1967, p. 55, figs. 339-344.

Occurrence: St. 93-2, 1 ♀; St. 94, 1 ♀; St. 97-2, 1 ♀; St. 98, 5 ♀; St. 108, 1 ♀; St. 113, 2 ♀, 1 ♂; St. 114, 12 ♀, 2 ♂; St. 115-1, 15 ♀, 3 ♂; St. 115-2, 27 ♀; St. 116, 1 ♂; St. 117-1, 1 ♂; St. 117-2, 1 ♂; St. 118, 1 ♀; St. 119, 2 ♀; St. 120, 1 ♀; St. 121-1, 2 ♀; St. 121-2, 1 ♀, 2 ♂.

Remarks: Female, 6.39-7.21 mm; male, 6.08-6.90 mm. *E. spinosa* is a deep water species and has usually been obtained from depths greater than 400 m in the Izu region. The species is widely distributed in the Pacific, Indian, and Atlantic Oceans as well as the Mediterranean Sea. Eleven specimens out of 75 females were ovigerous.

Euchaeta wolfendeni A. SCOTT, 1909

Euchaeta wolfendeni A. SCOTT, 1909, p. 68, pl. 17, figs. 1-12; SEWELL, 1929, p. 153; FARRAN, 1936, p. 91; MORI, 1937, p. 44, pl. 20, figs. 6-11; SEWELL, 1947, p. 115; WILSON, 1950, p. 217, pl. 8, figs. 74-78; TANAKA, 1958, p. 328.

Occurrence: St. 83, 2♀; St. 84-2, 23♀, 4♂; St. 93-1, 2♀; St. 94, 1♀, 1♂; St. 95, 3♀; St. 96, 8♀, 1♂; St. 97-2, 20♀, 1♂; St. 98, 40♀, 1♂; St. 115-1, 5♀; St. 115-2, 2♀.

Remarks: Female, 2.52-2.99 mm; male, 2.42-2.63 mm. The species has been recorded only from the Indian and Pacific Oceans. The species is epiplanktonic; in the Izu region it is rather numerous in the waters south of the axis of the Kuroshio. WILSON's (1950) specimen from off southwest coast of Mexico needs reinspection before his record can be considered definite.

RAREUCHAETA A. SCOTT, 1909

Pareuchaeta aequatorialis TANAKA, 1958

(Fig. 3, A; Fig. 4, A)

Euchaeta scotti, WOLFENDEN, 1911, p. 301, fig. 53, pl. 35, fig. 2.

Pareuchaeta aequatorialis TANAKA, 1958, p. 348, fig. 72, a-g.

Euchaeta aequatorialis, VERVOORT, 1963, p. 172, figs. 18-20.

Occurrence: St. 83, 2♀; St. 84-2, 2♀; St. 93-1, 1♀; St. 94, 1♀; St. 98, 2♀; St. 107, 1♀; St. 108, 6♀; St. 109, 1♀; St. 110, 1♀; St. 111-2, 2♀; St. 112-1, 2♀; St. 114, 3♀; St. 115-2, 4♀; St. 116, 1♀; St. 117-1, 2♀, 1♂; St. 118, 1♀; St. 120, 2♀; St. 121-1, 1♀; St. 121-2, 5♀; St. 122, 3♀.

Remarks: Female, 5.05-5.61 mm; male, 4.74 mm. The specimens recorded by VERVOORT (1963) were 4.50-5.10 mm in the female, 4.00-4.30 mm in the male. He described that the outer lobe of the 1st maxilla has 5 long and 2 short setae. However, the present specimen has, as has been previously described (TANAKA, 1958), only 5 long setae on it. The species has a fairly wide geographical distribution and has been recorded from the tropical Atlantic (WOLFENDEN, 1911), the Izu region (TANAKA, 1958), and the Gulf of Guinea (VERVOORT, 1963).

Pareuchaeta barbata (BRADY, 1883)

(Fig. 3, B; Fig. 4, B; Fig. 5, A, B)

Pareuchaeta barbata, SARS, 1925, p. 112, pl. 31, figs. 1-7; SEWELL, 1947, p. 120; BRODSKY, 1950, p. 209, fig. 122; TANAKA, 1958, p. 338, fig. 67, a-c; TANAKA and OMORI, 1967, p. 245.

Euchaeta barbata, VERVOORT, 1957, p. 83; VERVOORT, 1963, p. 166; OWRE and FOYO, 1967, p. 52, figs. 303-308.

Occurrence: St. 95, 1♀; St. 107, 6♀; St. 111-2, 1♀; St. 115-2, 5♀; St. 117-1, 1♀; St. 117-2, 2♀.

Remarks: Female, 8.29-10.82 mm. VERVOORT (1957, 1963) pointed out the confusion about the synonym of this species with related forms, and said that the female described by FARRAN (1908), WITH (1915), SARS (1925), JESPERSEN (1934), SEWELL (1947), BRODSKY (1950), and TANAKA (1958) are reliable. The male has been des-

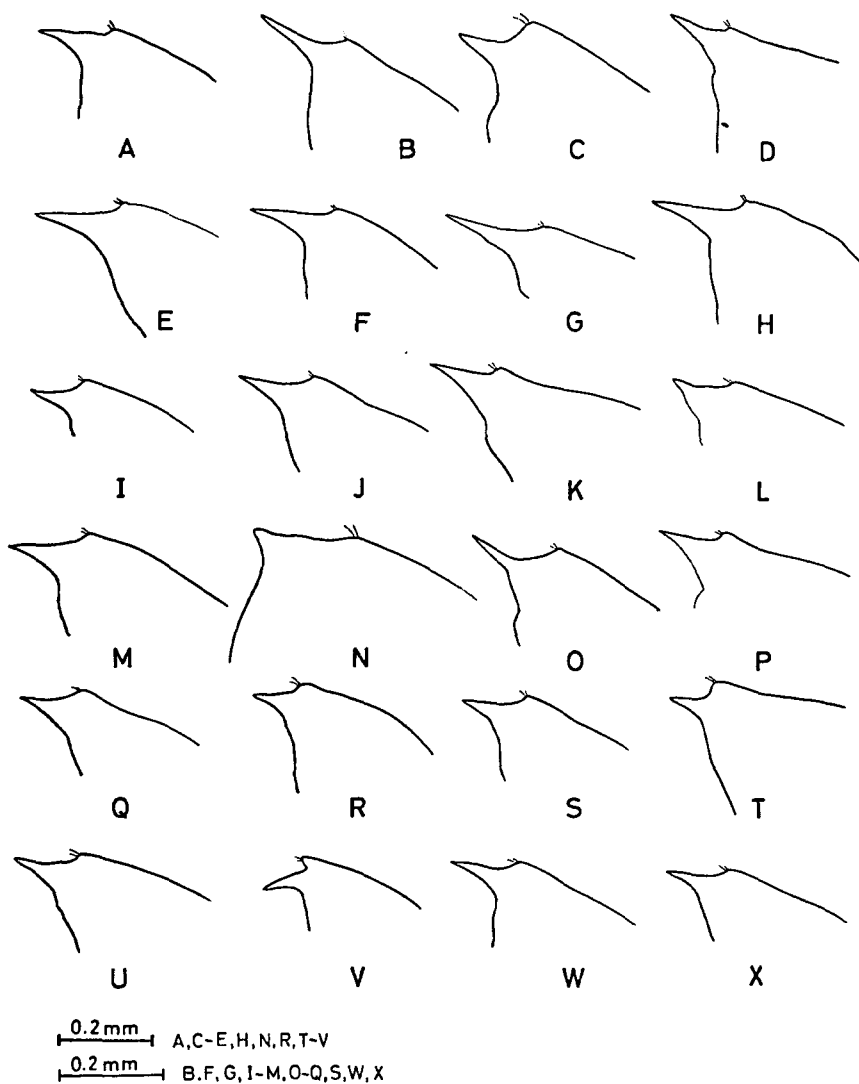


Fig. 3. Head of *Pareuchaeta*, female, left lateral side: A, *P. aequatorialis*; B, *P. barbata*; C, *P. birostrata*; D, *P. bisinuata*; E, *P. californica*; F, *P. confusa*; G, *P. dubia*; H, *P. elongata*; I, *P. eminens*; J, *P. hansenii*; K, *P. investigatoris*; L, *P. laudabilis*; M, *P. malayensis*; N, *P. paulovskii*; O, *P. polita*; P, *P. rubra*; R, *P. russelli*; S, *P. sarsi*; T, *P. scaphula*; U, *P. scotti*; V, *P. simplex*; W, *P. simulantis*; X, *P. striata*.

cribed by A. SCOTT (1909), WITH (1915), SARS (1925), and BRODSKY (1950). However, their descriptions seem to be insufficient, and there remains a question whether these specimens are really males of *P. barbata*.

The female specimens previously reported from the Izu region (TANAKA, 1958) were very small measuring only 6.17 mm. But the present specimens are much larger

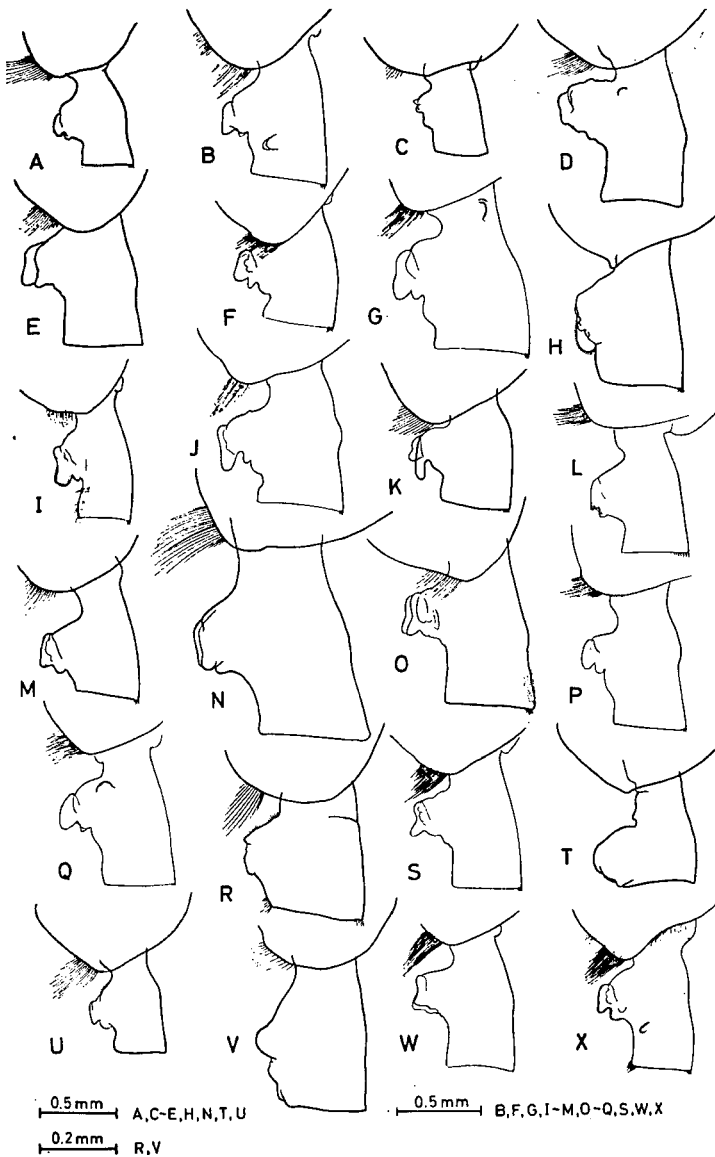


Fig. 4. Genital segment of *Pareuchaeta*, female, left lateral side: A, *P. aequatorialis*; B, *P. barbata*; C, *P. bisinuata*; D, *P. birostrata*; E, *P. californica*; F, *P. confusa*; G, *P. dubia*; H, *P. elongata*; I, *P. eminens*; J, *P. hanseni*; K, *P. investigatoris*; L, *P. laudabilis*; M, *P. malayensis*; N, *P. pavlovskii*; O, *P. polita*; P, *P. rubra*; R, *P. russelli*; S, *P. sarsi*; T, *P. scaphula*; U, *P. scotti*; V, *P. simplex*; W, *P. simulantis*; X, *P. striata*.

in size. In the 1st antenna the segments 1 to 4 are furnished with fine hairs on the posterior margin. The 1st maxilla has 6 long setae on the outer lobe, among which the proximal one is much shorter than the others: the endopod has 3 setae on the

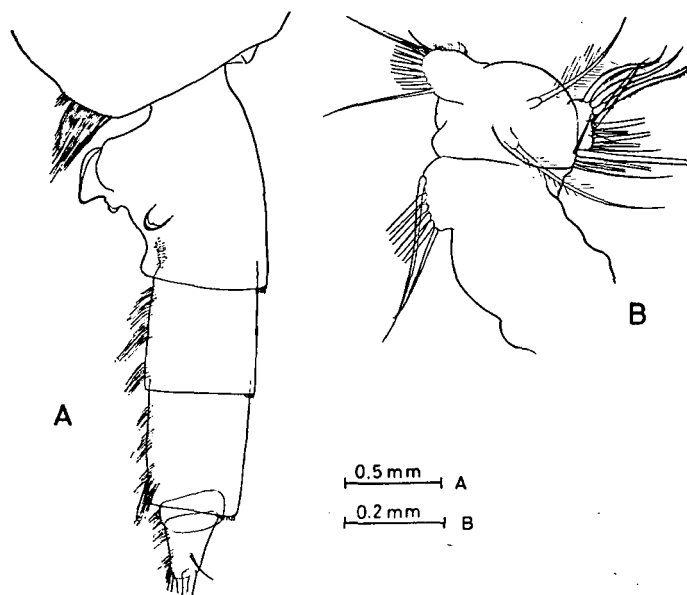


Fig. 5. *Pareuchaeta barbata* (BRADY), female: A, last thoracic segment and abdomen, lateral view; B, 1st maxilla.

1st, 4 on the 2nd, and 3 on the 3rd segment respectively. The 2nd basal segment has 5 setae.

The species is sparsely distributed in the deep layers of the Atlantic, Indian, and Pacific Oceans.

Pareuchaeta birostrata BRODSKY, 1950

(Fig. 3, C; Fig. 4, D; Fig. 6, A–H)

Pareuchaeta birostrata BRODSKY, 1950, p. 213, fig. 127; TANAKA, 1958, p. 359, fig. 77, a-i.

Occurrence: St. 83, 20♀, 2♂; St. 84–2, 4♀, 1♂; St. 93–2, 1♀, 2♂; St. 94, 1♂; St. 95, 1♂; St. 97–2, 3♀; St. 98, 3♀; St. 107, 12♀, 1♂; St. 108, 78♀, 3♂; St. 109, 8♀, 2♂; St. 110, 15♀, 1♂; St. 111–2, 2♀; St. 112, 3♀; St. 114, 1♀, 1♂; St. 118, 1♀; St. 119, 1♀; St. 120, 2♀; St. 121–1, 3♀; St. 121–2, 14♀; St. 122, 9♀.

Descriptive notes: Female, 7.73–8.65 mm; male, 6.28–6.90 mm.

In the female the genital segment has a large genital boss which is perpendicular to the segment: in lateral view from left side there is a small process on the proximal part of the segment. The 1st maxilla has 7 long and 2 short setae on the outer lobe: the exopod has 11 setae: the endopod has 3+3+3 setae: the 2nd basal segment has 5 setae.

In the male the cephalothorax and abdomen are in the proportional lengths as

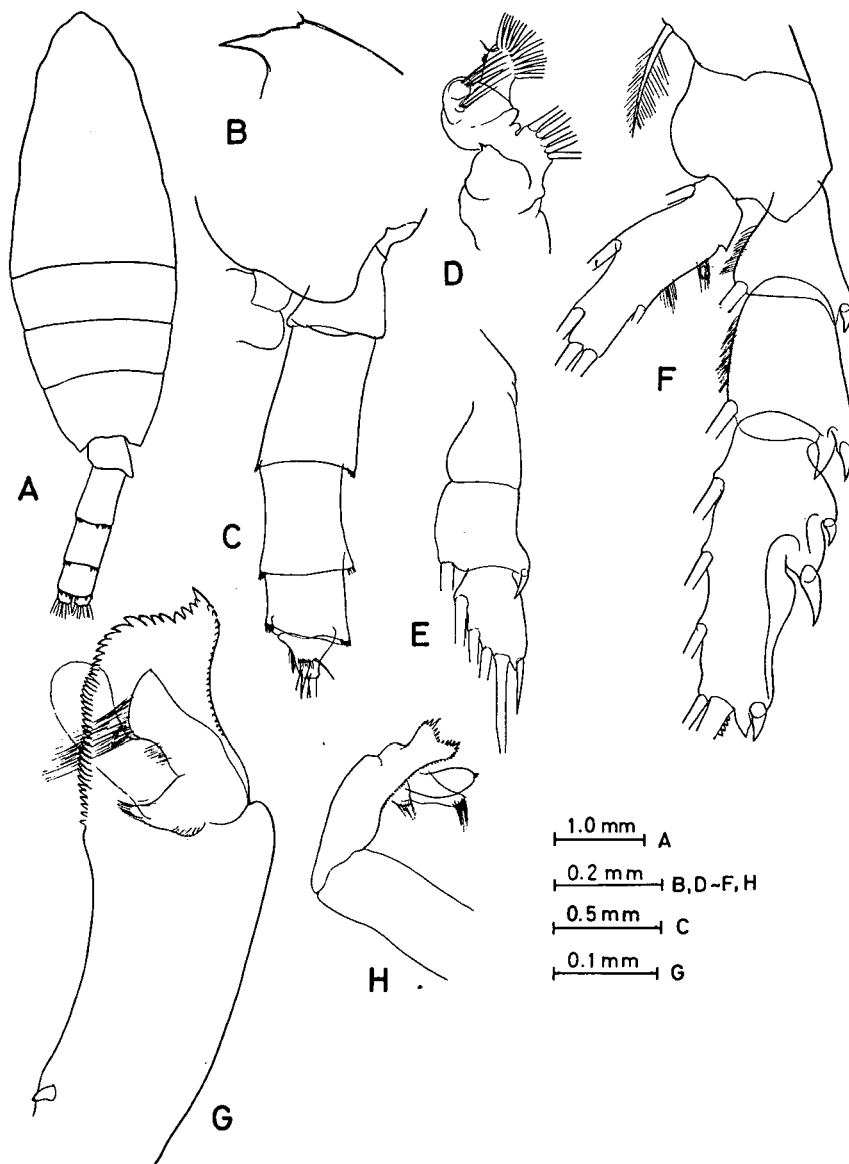


Fig. 6. *Pareuchaeta birostrata* BRODSKY, male: A, whole animal, dorsal view; B, head, lateral view; C, last thoracic segment and abdomen, lateral view; D, 1st maxilla; E, exopod of 1st leg; F, 2nd leg; G, clasper of left 5th leg; H, the same from another side.

71 to 29. The rostrum directs downwards. The abdominal segments and furca are in the following proportional lengths:

segment	1	2	3	4	5	furca	
	19	32	23	15	3	8	=100

The proportional lengths of the various segments of the 1st antenna are as follows:

segment	1	2	3	4	5	6	7	8-9-10	11	12-13	14	15	16
	61	38	28	19	23	27	30	65	23	67	42	51	51
	17	18	19	20	21	22	23	24-25					
	54	54	65	63	59	59	51	67	=1000				

In the 1st maxilla the setae on the 1st and 2nd inner lobes are much reduced; the endopod and the 2nd basal segment are reduced: the exopod has 10 long and 1 short setae: the outer lobe is furnished with 5 long setae. The 2nd maxilla is reduced much.

In the left 5th leg the serrated lamella of the 2nd segment of the exopod is dilated distally: the distal margin is hollowed and provided with 10 teeth. The structure of the dentate lamella resembles that of *P. solida*, but it differs from the latter in the reduced number of teeth on the outer margin of the serrated lamella.

Remarks: The species appears to be confined to the northwestern Pacific. BRODSKY (1950) recorded the species from the far-eastern seas of the USSR. It has been found at many stations in the present investigated waters, especially from such area as Sagami Bay where the influence of the submerged Oyashio water seems to be rather strong.

Pareuchaeta bisinuata SARS, 1907

(Fig. 3, D; Fig. 4, C)

Pareuchaeta bisinuata, A. SCOTT, 1909, p. 70, pl. 16, figs. 10-17; SARS, 1925, p. 123, pl. 33, figs. 16-22; SEWELL, 1947, p. 125; TANAKA, 1958, p. 343, fig. 69, a-e.

Euchaeta bisinuata, FARRAN, 1908, p. 12, pl. 3, figs. 17-19, pl. 4, fig. 4; WITH, 1915, p. 183, text-fig. 54, pl. 6, fig. 11; VERVOORT, 1963, p. 175; OWRE and FOYO, 1967, p. 53, figs. 128, 129, 309-314.

Occurrence: St. 93-1, 1♀; St. 94, 1♀; St. 108, 1♀; St. 110, 1♀; St. 111-1, 2♀; St. 112, 1♀; St. 115-2, 2♀; St. 117-2, 1♀; St. 120, 2♀; St. 121-1, 1♀; St. 121-2, 1♀.

Remarks: Female, 5.15-5.97 mm. The species is widely distributed in temperate and boreal parts of the Atlantic Ocean: it has been reported from the waters as far northward as 61°N (WITH, 1915), Greenland (JESPERSEN, 1934), off the west coast of Ireland (FARRAN, 1908), off the coast of Portugal and the Gulf of Gascony (SARS, 1925), and Gulf of Guinea (VERVOORT, 1963). In the Indian Ocean it has been found from the Bay of Bengal and northern part of the Arabian Sea (SEWELL, 1929,

1947). In the Pacific waters there are some records from the Philippine area (WILSON, 1950) and the Izu region (TANAKA, 1958).

Pareuchaeta californica (ESTERLY, 1906)

(Fig. 3, E; Fig. 4, E; Fig. 7, A-C)

Euchaeta californica ESTERLY 1906, p. 60, pl. 9, fig. 11, pl. 10, figs. 26, 34; DAVIS, 1949, p. 36, pl. 6, figs. 70-73.

Pareuchaeta calva TANAKA, 1958, p. 347, fig. 71, a-f.

Occurrence: St. 108, 1♀.

Descriptive notes: Female, 7.93 mm. The cephalothorax and abdomen are in the proportional lengths as 72 to 28. The abdominal segments and furca are in the following proportional lengths:

segment	1-2	3	4	5	furca	
	46	23	18	2	11	=100

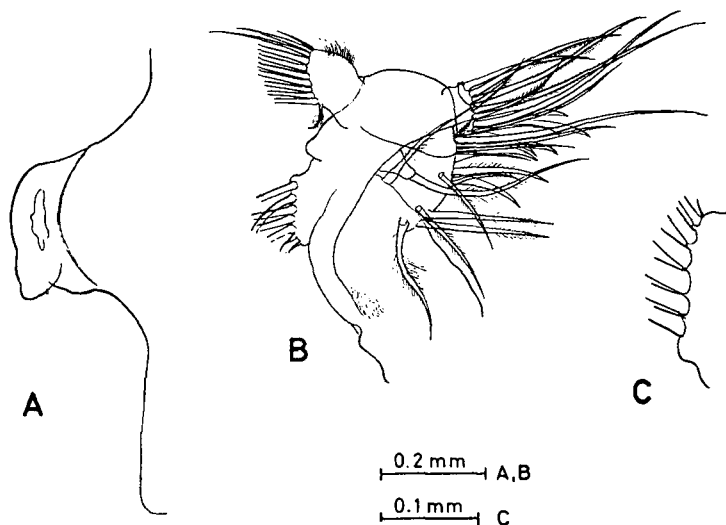


Fig. 7. *Pareuchaeta californica* (Esterly), female: A, genital segment, lateral view; B, 1st maxilla; C, outer lobe of 1st maxilla, right side.

The genital segment in lateral view as in *P. sarsi*: the lateral margin of the flange is long, reaching the distal margin of the genital aperture: the posterior process of the aperture is not remarkable: the ventral surface between the posterior process and the distal margin of the segment is very smooth in outline.

The proportional lengths of the various segments of the 1st antenna are as follows:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	50	42	21	20	23	25	25	34	21	23	30	39	41	48
segment	16	17	18	19	20	21	22	23	24-25					
	59	59	59	68	70	61	63	50	68	=1000				

The segments 2-15 are furnished with fine hairs on the posterior margin: the hairs on the segment 1 is scarce.

In the 1st maxilla the outer lobe has 5 long setae and 2 small spines on the left side, and 5 long and 1 short setae and a small spine on the right side: the endopod is furnished with 3+3+3 setae: the 2nd basal segment has 5 setae: the 1st inner lobe has 13 setae: the 2nd and 3rd inner lobes are each furnished with a single seta.

The swimming legs are as described by TANAKA (1958).

Remarks: The species resembles *P. sarsi*. However, it can be easily distinguished from the latter species by the shape of the genital aperture in ventral view. *P. calva* described by TANAKA (1958) from the Izu region is identical with the present species. The species has been only recorded from the Pacific waters; the San Diego region (ESTERLY, 1906), the Northeastern Pacific (DAVIS, 1949), and Sagami Bay (TANAKA, 1958).

Pareuchaeta confusa TANAKA, 1958

(Fig. 3, F; Fig. 4, F; Fig. 8, A-F)

Pareuchaeta confusa TANAKA, 1958, p. 344, fig. 70, a-i.

Occurrence: St. 93-1, 1 ♀; St. 93-2, 84 ♀, 1 ♂; St. 107, 1 ♀; St. 111-2, 1 ♀.

Remarks: Female, 6.90-7.93 mm; male, 6.54 mm. In the female the cephalothorax and abdomen are in the proportional lengths as 73 to 27. The rostrum is slender. The abdominal segments and furca are in the following proportional lengths:

segment	1-2	3	4	5	furca		
	44	22	22	3	9	=100	

The genital segment in lateral view resembles that of *P. malayensis*: the ventral surface of the segment between the posterior process of the aperture and the distal margin of the segment forms an obtuse angle, and is divided into two regions by apex of the angle: the anterior region is sinuated and is shorter than the posterior. In ventral view the genital aperture has, beside the large ear-shaped swellings of the lateral lobe, an inner small swelling on each side which differs in shape from that of *P. malayensis*: anterior to the inner small swellings is a heart-shaped arch furnished with fine hairs or something like muscle fibres. These characteristic features of the genital aperture are the main differences which separate the species from *P. malayensis*.

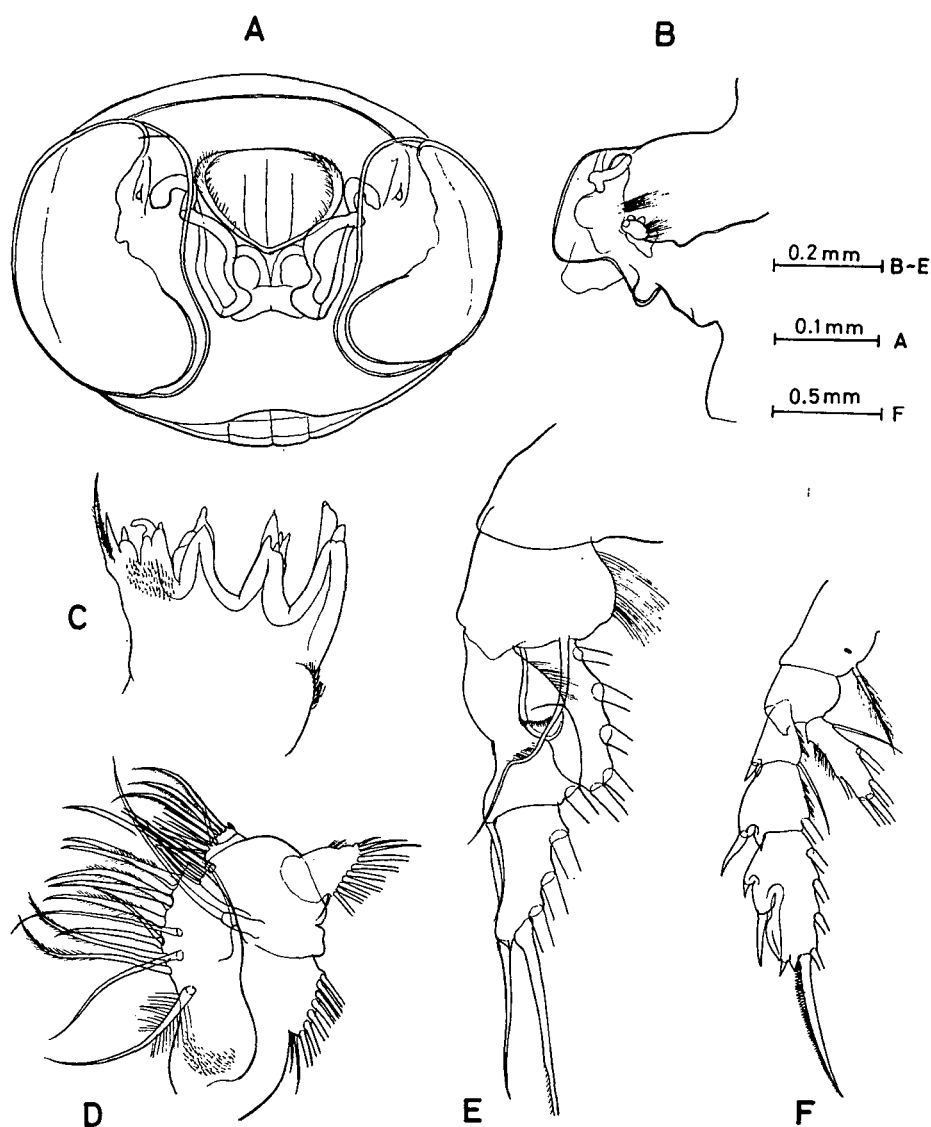


Fig. 8. *Pareuchaeta confusa* TANAKA, female: A, genital aperture, ventral view; B, genital segment, lateral view; C, mandible blade; D, 1st maxilla; E, 1st leg; F, 2nd leg.

In the 1st antenna the segment 24 to 25 is much shorter than the segment 19, whereas, in *P. malayensis* it is longer than the segment 19: the segments 1-15 are furnished with fine hairs on the posterior margin.

The mandible blade is provided with 6 teeth and a spine: the 4 main teeth differ in shape from those of *P. malayensis*. The 1st maxilla has 7 long and 2 short setae on the outer lobe: the endopod has 3+3+3 setae: the 2nd basal segment has 5 setae: the

1st inner lobe has 13 setae: the 2nd and 3rd inner lobes have each a single seta.

The swimming legs do not show any remarkable differences from those of *P. malayensis*.

The species has been recorded only from the Izu region.

Pareuchaeta dubia (ESTERLY, 1906)

(Fig. 3, G; Fig. 4, G)

Euchaeta dubia ESTERLY, 1906, p. 63, pl. 9, fig. 7, pl. 11, fig. 66, pl. 14, figs. 84, 85 (♂); VERVOORT, 1963, p. 176, figs. 21–23.

Pareuchaeta comosa TANAKA, 1958, p. 363, fig. 79, a–j.

Occurrence: St. 84–2, 1 ♀; St. 93–2, 2 ♀, 1 ♂; St. 94, 1 ♀; St. 97–2, 1 ♀; St. 98, 1 ♀; St. 107, 5 ♀, 1 ♂; St. 108, 7 ♀; St. 110, 1 ♀; St. 112, 1 ♀; St. 115–1, 4 ♀; St. 115–2, 2 ♀, 1 ♂; St. 117–2, 1 ♀, 1 ♂; St. 121–1, 2 ♀; St. 121–2, 7 ♀, 2 ♂; St. 122, 2 ♀.

Remarks: Female, 8.24–9.88 mm; male, 6.95–7.83 mm.

TANAKA (1958) described a species, both female and male, under the name *P. comosa*. However, according to VERVOORT (1963), it is identical with *P. dubia*. The species has been described by many authors only from the male specimen. We agree that the male of *P. comosa* is identical with *P. dubia*. VERVOORT (1963) has pointed out that the apex of the 2nd segment of the left 5th leg is prolonged into a toothed lamella: it is flat and distinctly bifid at the apex: in the incision there is a single tooth. However, there is no teeth in the incision in the specimens from the Izu region. The female is easily distinguished from the other members of the genus by the peculiar protuberance on the dorso-lateral margin of the genital segment, near one-fourth of the segment length on the left side from the proximal end: the proximal half of the ventral surface of the segment is swollen. The 1st maxilla has 6 long and 1 short setae.

The species has been recorded from the San Diego region (ESTERLY, 1906), the Izu region (TANAKA, 1958), and the Gulf of Guinea (VERVOORT, 1963).

Pareuchaeta elongata (ESTERLY, 1913)

(Fig. 3, H; Fig. 4, H; Fig. 9, A, B)

Euchaeta elongata ESTERLY, 1913, p. 182, pl. 10, figs. 5, 16, 27, pl. 11, fig. 37, pl. 12, fig. 49.

Euchaeta japonica MARUKAWA, 1921, p. 11, pl. 1, fig. 14, pl. 2, figs. 5–10, pl. 3, figs. 1–7; MORI, 1937, p. 47, pl. 22, figs. 3–11.

Pareuchaeta japonica, BRODSKY, 1950, p. 209, fig. 123.

Pareuchaeta elongata, TANAKA, 1958, p. 355, fig. 75, a–i.

Occurrence: St. 83, 1 ♀; St. 84–2, 2 ♀; St. 108, 2 ♀, 1 ♂; St. 109, 1 ♂; St. 110, 1 ♀, 1 ♂; St. 114, 1 ♂; St. 122, 5 ♀, 2 ♂.

Remarks: Female, 6.28–7.21 mm; male, 6.03–6.31 mm. The species is easily

distinguished from other members of the genus by a knoblike process on each side of the lateral distal margin of the thoracic segment, and asymmetrical lateral flanges on the genital aperture. The 1st maxilla has 7 long and 2 short setae on the outer lobe: the endopod has $2+1+3$ setae: the 2nd basal segment has 4 setae of which 3 are short. In the male the toothed lamella of the 2nd segment of the exopod of the left 5th leg is flat and bifid at the apical margin, and is incised on each of the lateral distal corners. The outer border of the segment is provided with a row of teeth extending about to the proximal end of the segment.

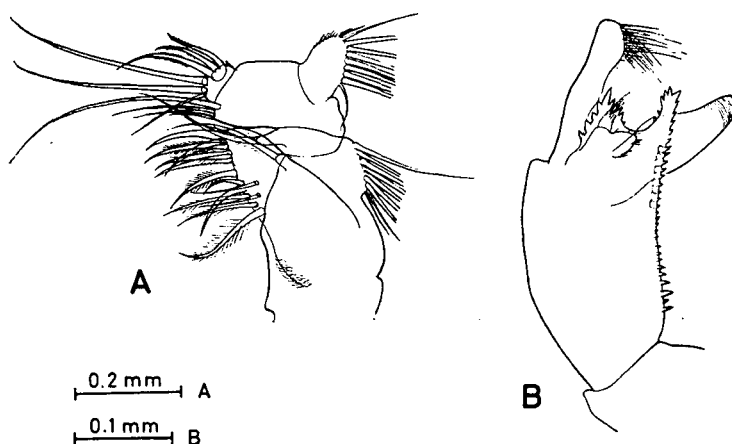


Fig. 9. *Pareuchaeta elongata* (ESTERLY): A, female, 1st maxilla; B, male, clasp organ of left 5th leg.

The species has a wide range of variability in length. ESTERLY's specimens from the San Diego region measured 4.13 mm in the female, whereas, those obtained from the Sea of Japan measured 8.0 mm (MARUKAWA, 1921): those from northern cold waters of Japan were 8.0 mm in the female and 8.4 mm in the male (MORI, 1937). The specimens from the Izu region were 6.81–7.39 mm in the female and 6.28 mm in the male (TANAKA, 1958), while those recorded from the far-eastern seas of the USSR were 6.3–6.5 mm in the female and 5.5–6.2 mm in the male (BRODSKY, 1950).

Pareuchaeta eminens sp. nov.

(Fig. 3, I; Fig. 4; I; Fig. 10, A–F)

Occurrence: St. 112, 1 ♀; St. 115–2, 1 ♀.

Descriptive notes: Female, 6.08–6.18 mm. The cephalothorax and abdomen are in the proportional lengths as 71 to 29. The lateral distal corner of the thoracic segment is obtusely triangular and is furnished with a dense bunch of long hairs. The rostrum is thick and is directed forwards and somewhat downwards; the frontal eminence high.

The abdominal segments and furca are in the following proportional lengths:

segment	1-2	3	4	5	furca
	44	22	20	4	10 = 100

The genital segment in lateral view has a large lateral flange producing posteriorly: the ventral margin of the segment is furnished with 3 patches of hairs at the distal one-fourth of the segment: in ventral view the aperture is seen to be provided with a V-shaped swelling between the small inner ear-shaped swellings. The 3rd, 4th, and 5th abdominal segments are furnished with hairs: fucal rami are hairy.

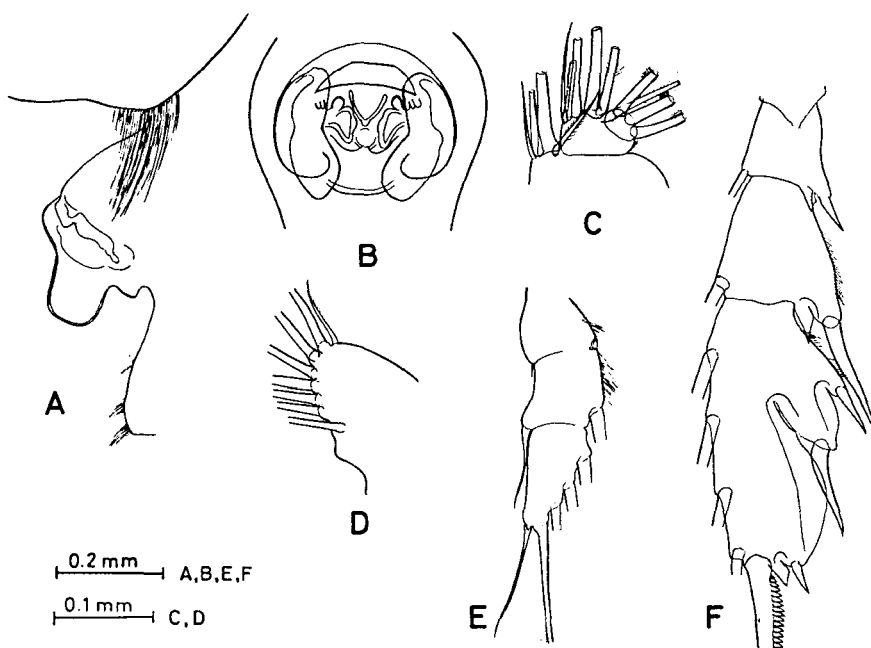


Fig. 10. *Pareuchaeta eminens* sp. nov., female; A, last thoracic segment and genital segment, lateral view; B, genital aperture, ventral view; C, endopod and 2nd basal segment of 1st maxilla; D, outer lobe of 1st maxilla; E, exopod of 1st leg; F, exopod of 2nd leg.

The 1st antenna is 4.9 mm in length: the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	49	36	22	19	21	21	26	32	19	21	28	40	43	49
segment	16	17	18	19	20	21	22	23	24-25					
	58	55	60	70	70	66	57	53	75	= 1000				

The segments 1-12 are each furnished with fine hairs on the posterior margin.

In the 1st maxilla the outer lobe has 7 long and 1 short setae: the endopod has 3+3+3 setae: the 2nd basal segment has 4 setae.

The 1st leg has a small outer marginal spine on the region where the 1st and 2nd segments of the exopod are fused. In the 2nd leg the outer marginal spine on the 2nd segment of the exopod is long, exceeding the distal end of the proximal spine of the 3rd segment: the 2nd outer marginal spine on the 3rd segment reaches the distal one-fourth of the outer margin between the base of the spine and the distal end of the 3rd segment: the sinus at the base of the spine is very deep.

Remarks: The species is distinguished from other members of the genus by the broad and prolonged lateral flanges of the genital aperture and by the 2nd leg provided with a long outer marginal spine on the 2nd segment of the exopod. A deep sinus at the base of the 2nd spine on the 3rd segment of the exopod is also a good discriminating character.

The species has been obtained from the southern waters off Honshu.

Pareuchaeta hanseni (WITH, 1915)

(Fig. 3, J; Fig. 4, J)

Euchaeta hanseni WITH, 1915, p. 181, fig. 52, a, b; OWRE and FOYO, 1967, p. 53, figs. 315-321.

Pareuchaeta hanseni, SARS, 1925, p. 115, pl. 31, figs. 15-18; JESPERSEN, 1934, p. 80; SEWELL, 1947, p. 121; TANAKA, 1958, p. 361, fig. 78, a-h.

Occurrence: St. 83, 4 ♀; St. 95, 1 ♂; St. 107, 1 ♀; St. 114, 6 ♀; St. 115, 1 ♀; St. 116, 1 ♀; St. 117-1, 1 ♀; St. 119, 1 ♀; St. 122, 1 ♀.

Remarks: Female, 8.65-9.99 mm; male, 8.24 mm. In the 1st maxilla the outer lobe has 7 long and 2 short setae.

The species has been recorded from the southwest Greenland (JESPERSEN, 1934), the North Atlantic (WITH, 1915), the Azores (SARS, 1925), the Arabian Sea (SEWELL, 1947), the Izu region (TANAKA, 1958), and the Florida Current (OWRE and FOYO, 1967).

Pareuchaeta investigatoris SEWELL, 1929

(Fig. 3, K; Fig. 4, K; Fig. 11, A-J)

Pareuchaeta californica, A. SCOTT, 1909, p. 71, pl. 15, figs. 1-8.

Pareuchaeta investigatoris SEWELL, 1929, p. 158, fig. 60, a-d (♂); SEWELL, 1947, p. 125 fig. 28, b-f.

Occurrence: St. 93-2, 1 ♀.

Descriptive notes: Female, 6.18 mm. The specimen has a general resemblance to *P. elongata*. The cephalothrax and abdomen are in the proportional lengths as 75 to 25. The lateral distal margin of the thoracic segment is rounded, and is provided

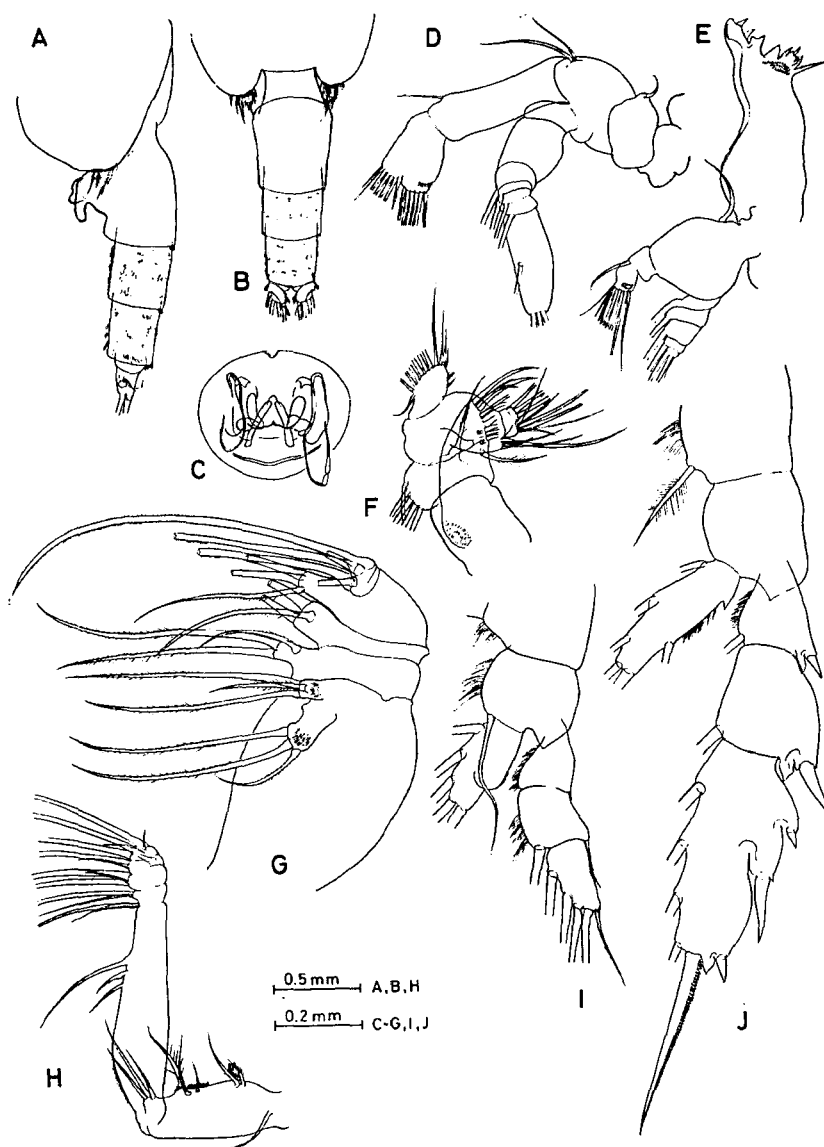


Fig. 11. *Pareuchaeta investigatoris* SEWELL, female: A, last thoracic segment and abdomen, lateral view; B, last thoracic segment and abdomen, dorsal view; C, genital aperture, ventral view; D, 2nd antenna; E, mandible; F, 1st maxilla; G, 2nd maxilla; H, maxilliped; I, 1st leg; J, 2nd leg.

with a tuft of long hairs. The rostrum is thick and is directed forwards: the frontal prominence is high.

The abdominal segments and furca are in the following proportional lengths:

segment	1-2	3	4	5	furca	
	44	21	21	1	13	=100

In the genital segment the lateral flanges of the aperture are asymmetrical: that on the left side is much elongated. The 3rd and 4th segments are covered with short hairs. The anal segment is concealed beneath the foregoing. The 2nd furcal seta is about 2 times as long as the combined lengths of the abdomen and furca.

The 1st antenna is 5.0 mm in length: the various segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	57	43	26	22	26	26	27	30	22	22	28	43	55	54
segment	16	17	18	19	20	21	22	23	24-25					
	57	54	54	65	67	60	54	46	69	=1000				

The segments 1-13 are furnished each with fine hairs on the posterior margin.

The 2nd antenna, mandible, 2nd maxilla, and maxilliped have no characteristic features. The 1st maxilla has 5 long setae on the outer lobe: the endopod has 3+3+3 setae: the 2nd basal segment has 5 setae.

In the 1st leg the 1st and 2nd segments of the exopod are fused: there is a minute spine on the region which corresponds to the distal margin of the 1st segment. The 2nd leg has 3-segmented exopod and 1-segmented endopod: in the exopod the outer marginal spine on the 2nd segment reaches the base of the proximal spine on the 3rd segment: the 2nd outer marginal spine of the 3rd segment reaches the distal one-fourth of the outer margin between the 2nd and 3rd outer marginal spines: the sinus at the base of the spine is deep: in the endopod the outer proximal margin is provided with a fairly remarkable triangular process.

Remarks: The present specimen is slightly smaller in size than those recorded by SEWELL (1947) from the Arabian Sea and the Gulf of Aden measuring 6.58 to 7.00 mm in length. Although there is slight difference in the number of setae on the outer lobe of the 1st maxilla between the present one and SEWELL's, it appears to be identical with *P. investigatores*. The species has been recorded from the Malay Archipelago (A. SCOTT, 1929), the Bay of Bengal (SEWELL, 1929), the Arabian Sea and Gulf of Aden (SEWELL, 1947), and the Izu region (present record).

Pareuchaeta laudabilis sp. nov.

(Fig. 3, L; Fig. 4, L; Fig. 12, A-G)

Occurrence: St. 117-1, 1♀.

Descriptive notes: Female, 7.35 mm. The cephalothorax and abdomen are in the proportional lengths as 72 to 28. The cephalothorax elongate ovate; the lateral

distal margin of the thoracic segment obtusely rounded, and is furnished with a bunch of long hairs on the ventro-distal margin. The rostrum is very thick at the proximal, and is directed forwards; the frontal prominence low.

The abdominal segments and furca are in the following proportional lengths:

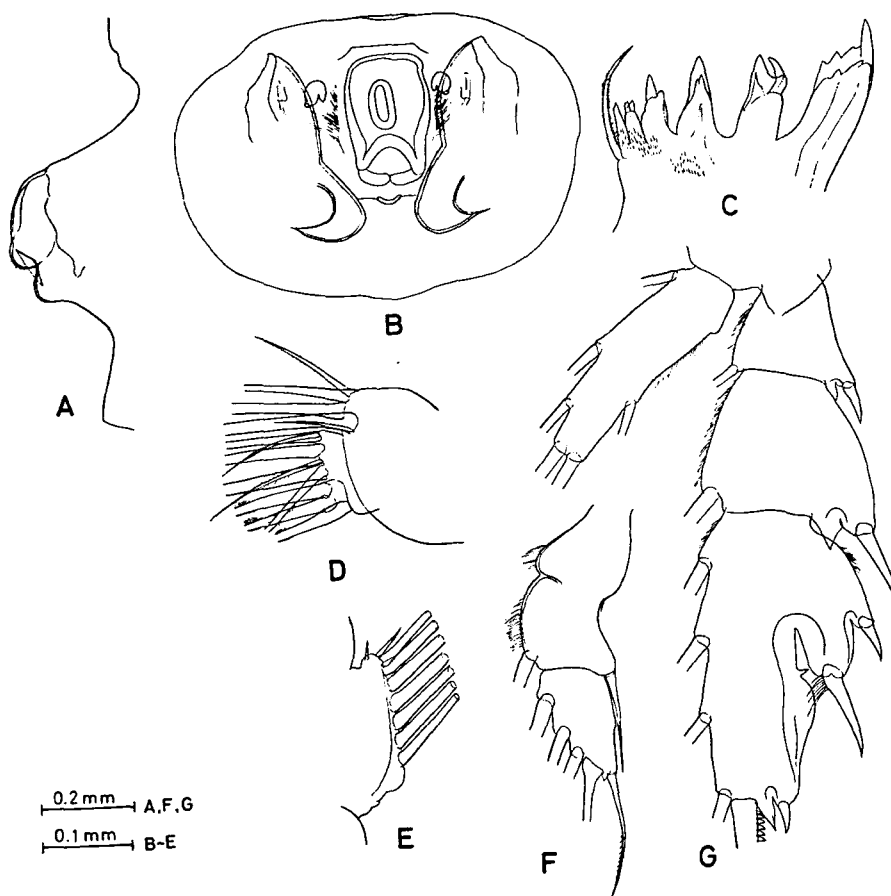


Fig. 12. *Pareuchaeta laudabilis* sp. nov., female: A, genital segment, lateral view; B, genital aperture, ventral view; C, mandible blade; D, endopod and 2nd basal segment of 1st maxilla; E, outer lobe of 1st maxilla; F, exopod of 1st leg; G, 2nd leg.

segment	1-2	3	4	5	furca	
	44	21	17	3	15	=100

The genital segment resembles that of *P. aequatorialis*: the lateral flange of the genital aperture is not prominent, but is flat on the ventral margin: the posterior process of the aperture is remarkable: in ventral view there is a large rectangular swelling between the lateral flanges of the aperture.

The 1st antenna 5.4 mm in length; the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	57	40	22	21	25	22	21	34	18	21	25	38	38	44
16	17	18	19	20	21	22	23	24-25						
55	57	61	72	70	63	59	53	74	=1000					

The segments 1-7 are furnished each with fine hairs on the posterior margin.

In the 1st maxilla the outer lobe has 7 long and 2 short setae: the endopod has 3+3+3 setae: the 2nd basal segment has 5 setae: the exopod has 11 setae: the 1st inner lobe has 13 setae: the 2nd and 3rd inner lobes have each a single seta.

The 1st leg has a small outer marginal spine on the region that corresponds to the distal end of the 1st segment.

In the 2nd leg the outer marginal spine on the 2nd segment of the exopod scarcely reaches the base of the 1st marginal spine of the 3rd segment: the 2nd marginal spine on the 3rd segment reaches only the distal one-third of the outer margin between the base of the spine and the distal end of the segment: the sinus at the base of the 2nd spine is very deep, extending proximally to the line joining the base of the 1st outer marginal spine and the 2nd inner seta: the endopod 1-segmented; its proximal outer margin has a blunt process instead of an ordinary small triangular process.

Remarks: The species is characterized by the structure in the genital aperture and in the 2nd pair of legs.

Pareuchaeta malayensis SEWELL, 1929

(Fig. 3, M; Fig. 4, M; Fig. 13, A-F)

Pareuchaeta barbata, A. SCOTT, 1909, p. 70, pl. 18, figs. 1-8.

Pareuchaeta malayensis SEWELL, 1929, p. 160, fig. 62, a-j; SEWELL, 1947, p. 121, fig. 27, a-f; TANAKA, 1958, p. 341, fig. 68, a-h.

Euchaeta malayensis, OWRE and FOYO, 1967, p. 53, figs. 322-326.

Occurrence: St. 83, 1♂; St. 84-2, 1♀; St. 93-2, 2♀, 6♂; St. 94, 1♀; St. 95, 1♀; St. 97-2, 1♀; St. 98, 2♀; St. 108, 2♀; St. 110, 1♀, 1♂; St. 111-2, 1♀; St. 114, 1♀; St. 115, 3♀; St. 116, 1♀; St. 117-1, 1♀; St. 117-2, 1♀; St. 118, 1♀; St. 119, 2♀; St. 120, 1♀; St. 121-2, 1♀; St. 122, 1♀.

Descriptive notes: Female, 6.49-7.11 mm; male, 6.03-6.80 mm.

In the female the cephalothorax and abdomen are in the proportional lengths as 73 to 27. The rostrum is directed forwards and slightly downwards.

The abdominal segments and furca are in the following proportional lengths:

segment	1-2	3	4	5	furca
	43	23	21	2	11 = 100

The genital segment in the lateral view has a close resemblance to that of *P. confusa*: the ventral surface of the segment between the posterior process of the aperture and the distal end of the segment forms an obtuse angle, and is divided into anterior and posterior regions by the apex of the angle: the anterior region is flat and is longer than the posterior region: in *P. confusa* the anterior region is swollen and is shorter than

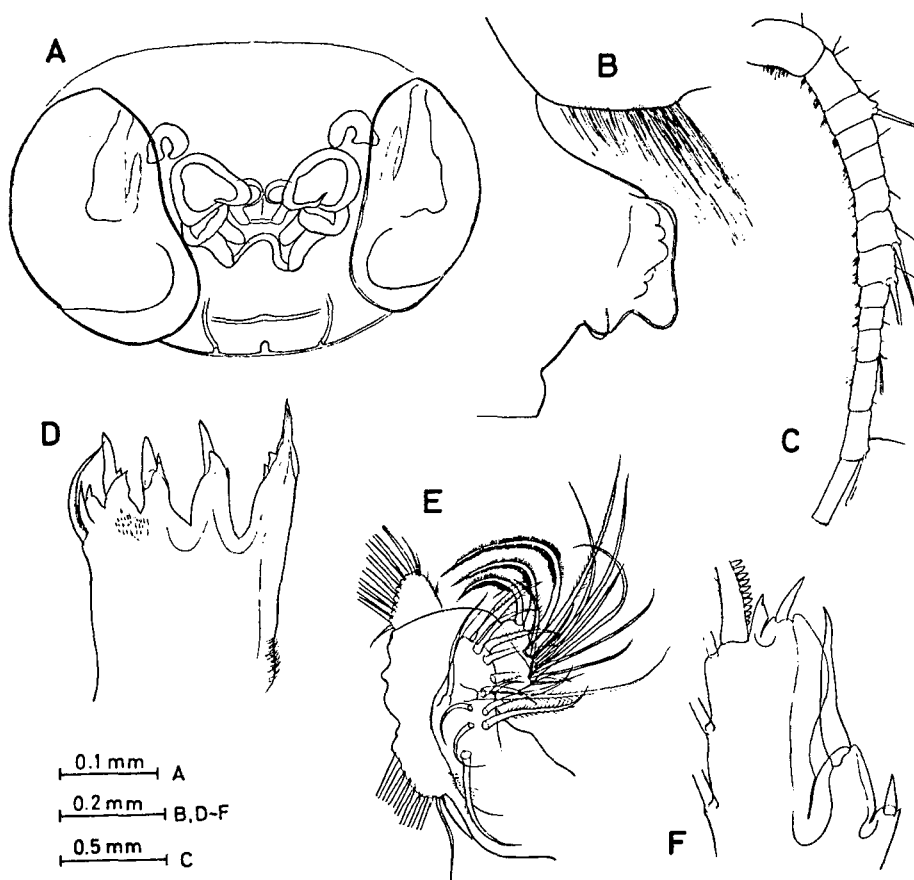


Fig. 13. *Pareuchaeta malayensis* SEWELL, female: A, genital aperture, ventral view; B, last thoracic segment and genital segment, lateral view; C, proximal part of 1st antenna; D, mandible blade; E, 1st maxilla; F, distal part of exopod of 2nd leg.

the posterior region. The genital aperture in the ventral view is similar in structure to that figured by SEWELL (1947).

The 1st antenna is about 6.2 mm in length: the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	52	40	27	22	25	27	23	28	17	20	23	38	42	52
16	17	18	19	20	21	22	23	24-25						
60	60	60	69	65	60	59	53	78	=1000					

The segments 1-13 are fringed each with fine hairs on the posterior margin.

The mandible blade is furnished with 6 distinct teeth and 1 spine: their shapes differ from those found in *P. confusa*. In the 1st maxilla the outer lobe has 7 long and 2 short setae: the 1st, 2nd, and 3rd segments of the endopod have each 3 setae: the 2nd basal segment has 5 setae: the exopod has 11 setae: the 1st inner lobe has 13 setae: the 2nd and 3rd lobes have each a single seta.

In the 1st leg the 1st and 2nd segments of the exopod are fused: there is a small spine on the region where the 1st segment fused with the 2nd. In the 2nd leg the outer marginal spine on the 2nd segment of the exopod almost reaches the distal end of the 1st marginal spine of the 3rd segment: the 2nd marginal spine of the 3rd segment reaches the base of the 3rd spine.

In the male the plate-like lamella of the 2nd segment of the exopod of the left 5th leg is twisted, and is deeply incised at the distal end: the outer margin of the lamella carries an isolated large teeth and several small ones: the distal part is bifid: the inner margin is serrated on either side at the apex.

Remarks: The species has been recorded from the Malay Archipelago (A. SCOTT, 1909), the Bay of Bengal (SEWELL, 1929), the Arabian Sea (SEWELL, 1947), and the Izu region (TANAKA, 1958). Recently, it has been found in the Florida Current (OWRE and FOYO, 1967).

Pareuchaeta pavlovskii BRODSKY, 1955

(Fig. 3, N; Fig. 4, N; Fig. 14, A-I)

Pareuchaeta pavlovskii BRODSKY, 1955, p. 186, figs. 1-13; TANAKA and OMORI, 1967, p. 246.

Occurrence: St. 111-2, 1♀.

Descriptive notes: Female, 11.0 mm. The cephalothorax and abdomen are in the proportional lengths as 70 to 30. The rostrum is thick and short. The lateral margin of the last thoracic segment round; it is slightly produced at the distal margin: the lateral margin is, as usual, furnished with a bunch of long hairs.

The abdomen 4-segmented; the segments are in the following proportional lengths:

segments	1-2	3	4	5	furca		
	38	23	20	4	15	=100	

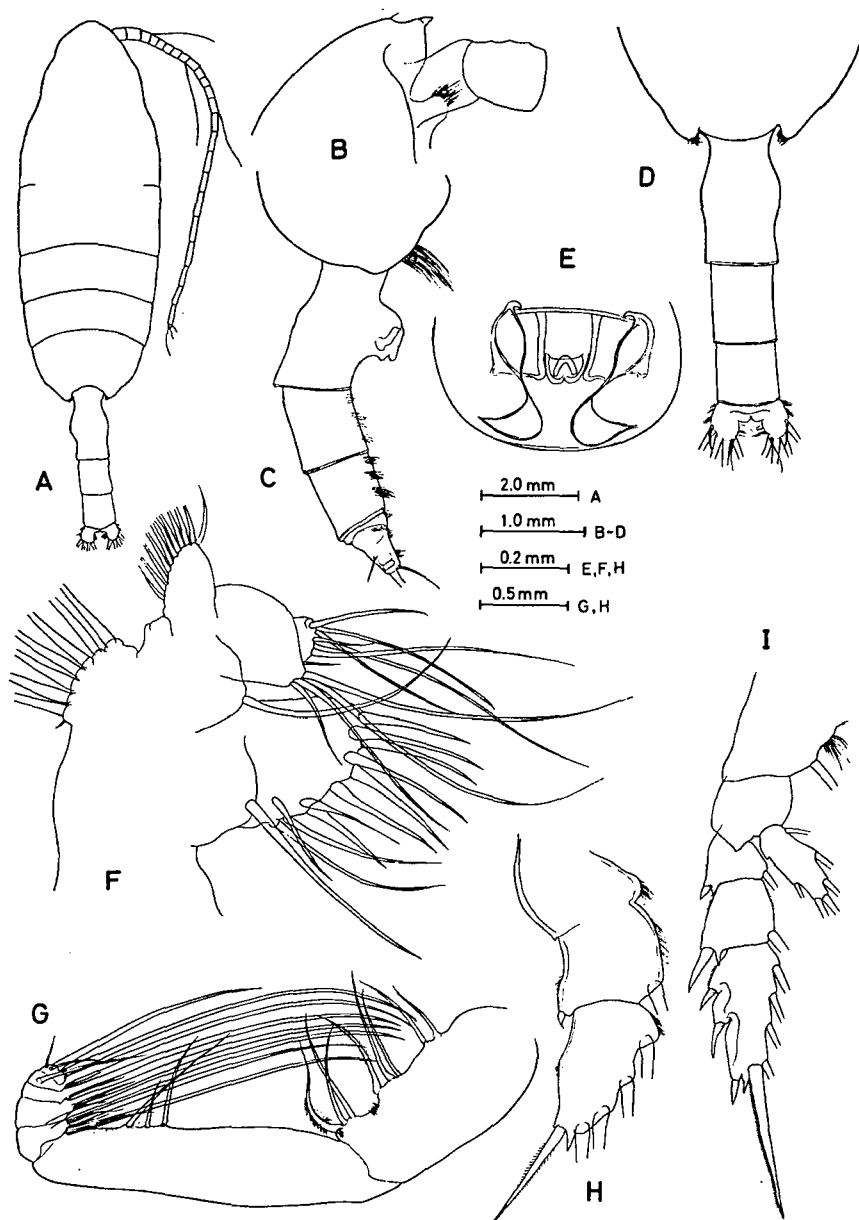


Fig. 14. *Pareuchaeta pavlovskii* Brodsky, female: A, whole animal, dorsal view; B, head, lateral view; C, last thoracic segment and abdomen, lateral view; D, last thoracic segment and abdomen, dorsal view; E, genital aperture, ventral view; F, 1st maxilla; G, maxilliped; H, exopod of 1st leg; I, 2nd leg.

In the lateral view the genital segment has genital boss directing slightly downwards: the lateral flanges of the genital aperture are short: the posterior process of the aperture is not remarkable. The 2nd and 3rd abdominal segments are furnished with a bunch of hairs on the ventral surface: the hairs on the 3rd segment are rather densely arranged.

The 1st antenna reaches the distal margin of the 3rd thoracic segment: the various segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	60	41	25	22	26	26	26	38	21	22	25	41	40	44
16	17	18	19	20	21	22	23	24-25						
55	56	59	67	69	66	55	55	62	=1000					

The segment 2-15 are each furnished with hairs on the posterior margin.

The endopod of the 2nd antenna is a little longer than the exopod. The mandibular palp robust; the exopod is about as long as the endopod. In the 1st maxilla the outer lobe has 7 long setae: the endopod has 3+2+1 setae: the 2nd basal segment has 5 setae: the exopod has 11 setae: the 1st inner lobe has 12 setae: the 2nd inner lobe has no seta: the 3rd inner lobe has 1 seta. In the 2nd maxilla the number of setae on the various lobes is as follows:

lobe	1	2	3	4	5	endopod
	3	3	3	3	3	6

The maxilliped has the following number of setae on the endopod:

lobe	1	2	3	4	5
	4	3	2	3	4

The 1st leg has a minute outer marginal spine on the region where the 1st and 2nd segments of the exopod are fused: the outer marginal spine in the 2nd segment is very short. In the 2nd leg the outer marginal spine on the 2nd segment of the exopod reaches the base of the 1st marginal spine of the 3rd segment: the 2nd outer marginal spine on the 3rd segment of the exopod reaches the half-way between bases of the 2nd and 3rd marginal spines.

Remarks: The species is very large in size. The specimens collected from deep layers in the Bering Sea and the Kuril-Kamchatka Trench were 10.4-10.8 mm in length (BRODSKY, 1955), while those from off southeast coast of Japan were 11.0-11.6 mm (TANAKA and OMORI, 1967).

Pareuchaeta polita sp. nov.

(Fig. 3, O; Fig. 4, O; Fig. 15, A-D)

Occurrence: St. 84-2, 1♀; St. 114, 1♀.

Descriptive notes: Female, 8.03-8.29 mm. In general appearance the specimen comes near to *P. sarsi*. The cephalothorax and abdomen are in the proportional lengths as 72 to 28. The rostrum is very thick at its base but much pointed at the distal half: it is directed straightly forwards.

The abdominal segments and furca are in the following proportional lengths:

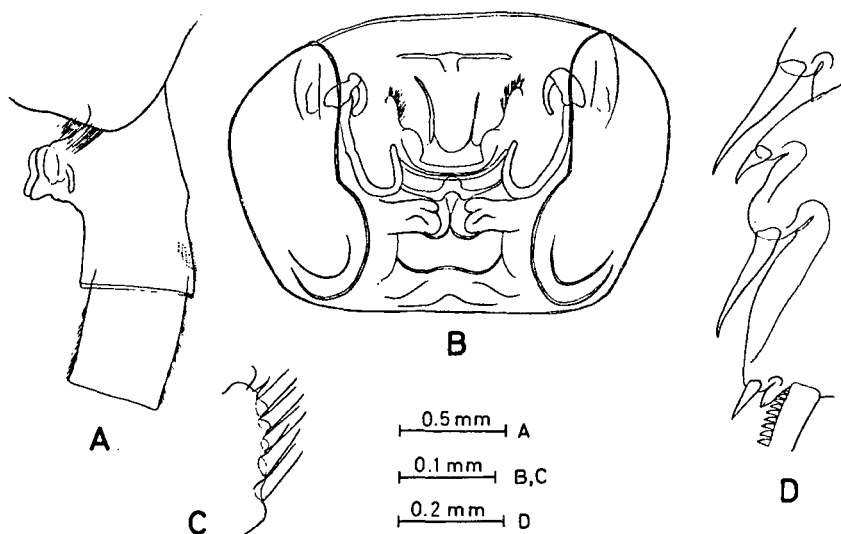


Fig. 15. *Pareuchaeta polita* sp. nov., female: A, last thoracic segment and abdomen, lateral view; B, genital aperture, ventral view; C, outer lobe of 1st maxilla; D, distal part of exopod of 2nd leg.

segment	1-2	3	4	5	furca	
	42	24	20	2	12	=100

In lateral view the lateral flange of the genital aperture is concave at the ventral margin: the posterior process of the aperture is not remarkable: the dorsal surface of the segment is slightly swollen at the region opposite to the genital aperture, and is furnished with fine short hairs on the distal part. The 3rd and 4th abdominal segments are furnished with fine hairs.

The 1st antenna is about 5.7 mm in length and has the segments in the following proportional lengths:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	54	42	24	20	24	21	25	32	20	20	27	38	38	51
16	17	18	19	20	21	22	23	24-25						
54	56	58	71	71	66	62	55	71	=1000					

These proportions are near to those found in *P. sarsi*.

In the 1st maxilla the outer lobe has 5 long setae and 2 very minute ones: the spination on the segments of the endopod and on the 2nd basal segment are quite the same as in *P. sarsi*.

The swimming legs are as in *P. sarsi*.

Remarks: The species is closely allied to *P. sarsi*. However, it can be distinguished from the latter by the much pointed rostrum and the structure of the genital segment. The species has been obtained in the southern waters off Honshu (present record).

Pareuchaeta prudens sp. nov.

(Fig. 3, P; Fig. 4, P; Fig. 16, A-E)

Occurrence: St. 115-2, 1♀.

Descriptive notes: Female, 7.78 mm. The cephalothorax and abdomen are in the proportional lengths as 72 to 28. The cephalothorax elongate ovate; the posterior thoracic margin is obtusely rounded and is provided with a dense bunch of long hairs. The rostrum thick; it is directed forwards.

The abdominal segments and furca are in the following proportional lengths:

segment	1-2	3	4	5	furca	
	43	22	22	2	11	=100

The genital segment in dorsal view is constricted on each side in the distal one-third of the lateral margin: in lateral view the dorsal surface is swollen at the middle section as much as *P. hansenii*: in ventral view there is a cup-shaped swelling between the ear-shaped lateral flanges of the aperture. The 3rd and 4th segments are covered with long fine hairs. The anal segment is telescoped into the 4th one.

The 1st antenna is 5.2 mm in length: the various segments have the following proportional lengths:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	72	41	23	21	25	25	23	33	20	21	25	37	35	39
16	17	18	19	20	21	22	23	24-25						
50	54	62	72	72	64	60	54	72	=1000					

The segments 1-13 are furnished with hairs on the posterior margin.

The 1st maxilla has 6 long setae on the outer lobe: the endopod has 3+3+3 setae: the 1st inner lobe has 13 setae: the 2nd and 3rd inner lobes have each a single seta: the 2nd basal segment has 5 setae.

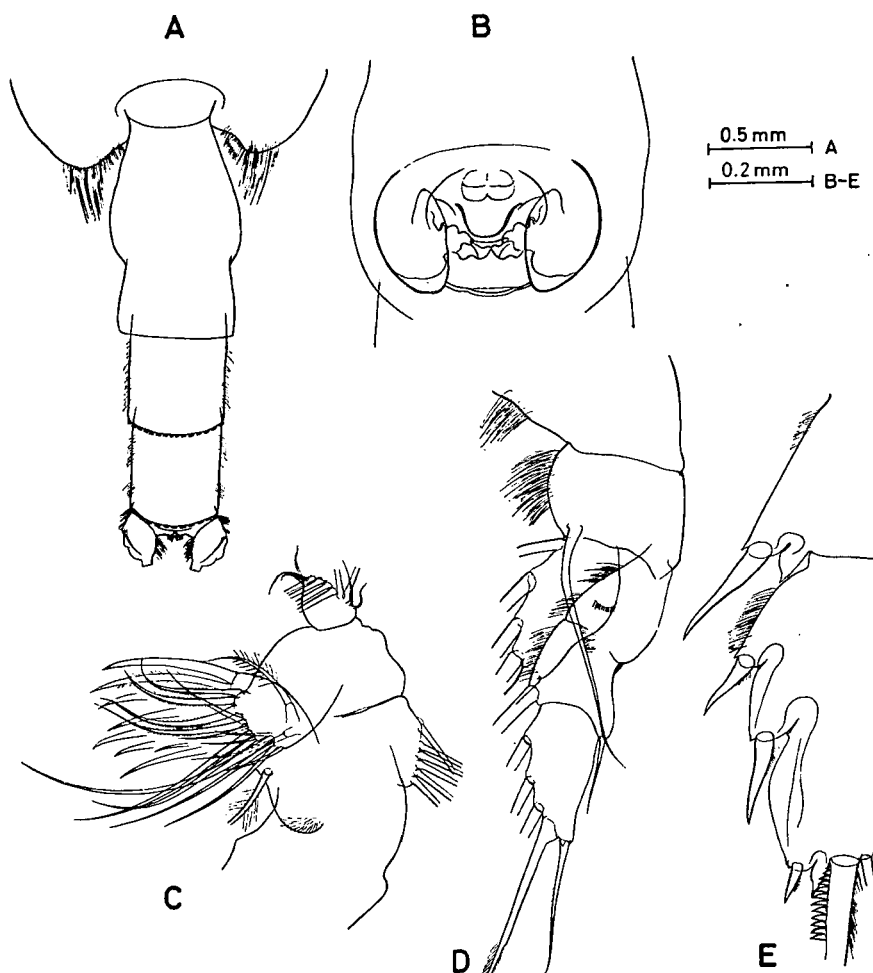


Fig. 16. *Pareuchaeta prudens* sp. nov., female: A, last thoracic segment and abdomen, dorsal view; B, genital aperture, ventral view; C, 1st maxilla; D, 1st leg; E, distal part of exopod of 2nd leg.

The 1st leg has a small outer marginal spine on the region which corresponds to the distal end of the 1st segment. In the 2nd leg the marginal spine on the 2nd segment of the exopod reaches the base of the 1st outer marginal spine of the 3rd segment: the 1st outer marginal spine on the 3rd segment is long and reaches the base of the 2nd

outer marginal spine: the 2nd spine reaches the distal one-third of the outer margin between the 2nd and 3rd outer marginal spines: the sinus at the base of the 2nd spine is shallow.

Remarks: The shape of the genital segment in dorsal view, and the structure of the genital aperture distinguish the present specimen from the other species of the genus. The species has been collected in the waters off Aogashima Is. (present record).

Pareuchaeta rubra BRODSKY, 1950

(Fig. 3, Q; Fig. 4, Q; Fig. 17, B)

Pareuchaeta rubra BRODSKY, 1950, p. 214, fig. 128.

Pareuchaeta crassa TANAKA, 1958, p. 357, fig. 76, a-i.

Occurrence: St. 83, 3♀, 1♂; St. 93-2, 1♀; St. 107, 2♀; St. 108, 3♀; St. 110, 7♀, 1♂; St. 111-2, 1♀; St. 115-2, 1♀; St. 117-1, 2♀; St. 117-2, 3♀; St. 118, 2♀; St. 121-2, 2♀.

Remarks: Female, 7.21-7.67 mm; male, 6.75 mm.

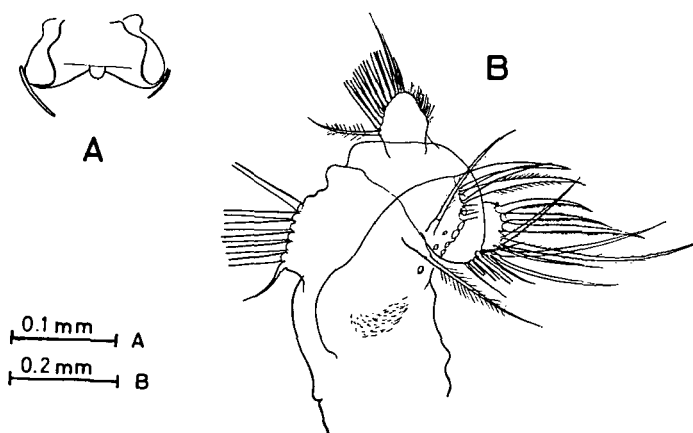


Fig. 17. A, *Pareuchaeta russelli* (FARRAN), female, genital aperture, ventral view; B, *Pareuchaeta rubra* BRODSKY, female, 1st maxilla.

TANAKA (1958) described and figured a species of *Pareuchaeta* under the name *P. crassa*. On comparison of the species with *P. rubra* which has been incompletely described by BRODSKY (1950), we are convinced that *P. crassa* is identical with *P. rubra*.

In the female the lateral flanges of the genital aperture has, as BRODSKY stated, a round ventral margin, and projects remarkably at the distal end. But he did not mention about the presence of a well defined process on the left shoulder of the segment. The 1st maxilla has 6 long and 1 short setae on the outer lobe.

In the male the present specimen has the toothed plate on the 2nd segment of the exopod of the left 5th leg, which comes nearest in shape to that of *P. rubra* figured by BRODSKY.

The species has been reported from the far-eastern seas and polar basin of the USSR (BRODSKY, 1950), and from the Izu region (TANAKA, 1958).

Pareuchaeta russelli (FARRAN, 1936)

(Fig. 3, R; Fig. 4, R; Fig. 17, A)

Euchaeta russelli FARRAN, 1936, p. 91, fig. 7, a-i.

Euchaeta daitomarui MORI, 1937, p. 48, pl. 23, figs. 4-8.

Pareuchaeta russelli, TANAKA, 1958, p. 334, fig. 65, a-g.

Occurrence: St. 83, 15 ♀, 4 ♂; St. 84-2, 18 ♀, 6 ♂; St. 93-1, 6 ♀, 3 ♂; St. 94, 1 ♀, 1 ♂; St. 96, 11 ♀, 2 ♂; St. 109, 7 ♀, 2 ♂; St. 110, 1 ♂; St. 111-2, 7 ♀, 1 ♂; St. 112, 2 ♀; St. 113, 1 ♀, 1 ♂.

Remarks: Female, 3.50-3.76 mm; male, 3.24-3.61 mm.

In the 1st maxilla the outer lobe has 5 long and 1 short setae: the endopod has 3+1+2 setae: the 2nd basal segment has 3 setae.

The species has been recorded only from the Pacific Ocean. FARRAN (1936) recorded it from the Great Barrier Reef; MORI (1937) from off northeastern coast of Japan; TANAKA (1958) from the Izu region.

Pareuchaeta sarsi (FARRAN, 1908)

(Fig. 3, S; Fig. 4, S; Fig. 18, A-D)

Euchaeta sarsi FARRAN, 1908, p. 41, pl. 3, figs. 15, 16; WITH, 1915, p. 177, pl. 6, fig. 7, text-fig. 50, a-f (♀); VERVOORT, 1963, p. 167.

Pareuchaeta dentata A. SCOTT, 1909, p. 76, pl. 21, figs. 16-23.

Pareuchaeta sarsi, SARS, 1925, p. 114, pl. 31, figs. 8-14; SEWELL, 1947, p. 127, fig. 29, a, b; TANAKA, 1958, p. 351, fig. 73, a-j.

Occurrence: St. 93-1, 1 ♀; St. 93-2, 180 ♀, 14 ♂; St. 108, 1 ♀.

Remarks: Female, 8.45-9.68 mm; male, 7.31-7.93 mm.

In the female the cephalothorax and abdomen are in the proportional lengths as 74 to 26. The abdominal segments and furca are in the following proportional lengths:

segment	1-2	3	4	5	furca	
	44	22	20	2	12	=100

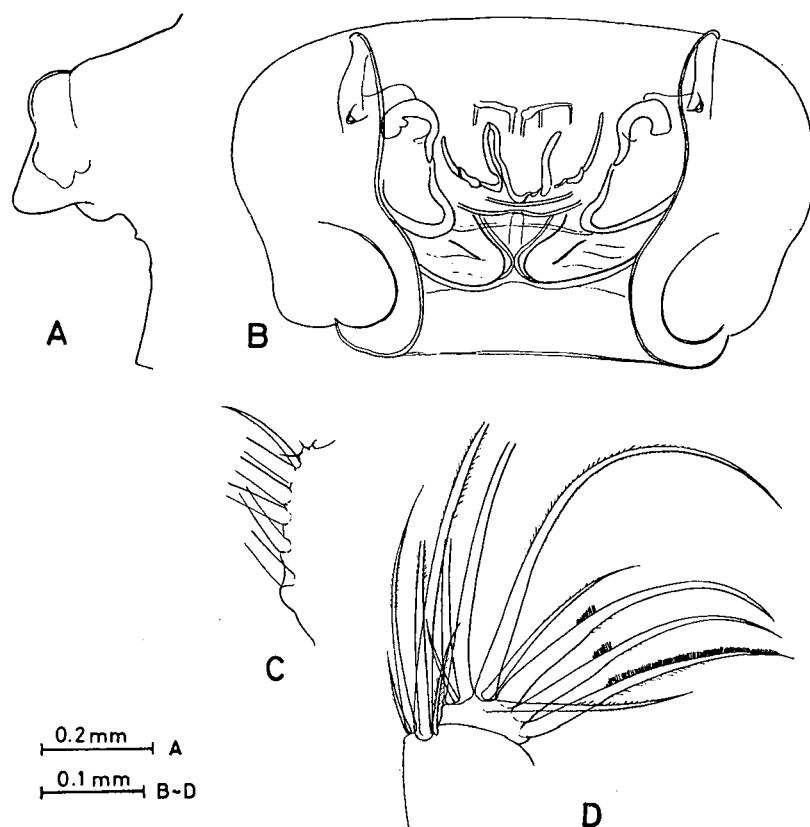


Fig. 18. *Pareuchaeta sarsi* (FARRAN), female: A, genital segment, lateral view; B, genital aperture, ventral view; C, outer lobe of 1st maxilla; D, endopod and 2nd basal segment of 1st maxilla.

In lateral view the lateral flange of the genital aperture is concave on the ventral margin: its distal margin exceeds the posterior process of the genital aperture: in ventral view the aperture is just the same as that figured by WIRTH (1915): the aperture is not round in shape but wider than long.

The proportional lengths of the various segments of the 1st antenna are as follows:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	52	36	22	20	24	24	24	32	20	22	30	38	41	50
	16	17	18	19	20	21	22	23	24-25					
	57	59	60	71	71	65	61	55	70	=1000				

The segments 2-14 are furnished each with fine hairs on the posterior margin.

In the 1st maxilla the outer lobe has 5 long, 1 short, and 3 small setae: the endo-

pod has 3+3+3 setae: the 2nd basal segment has 5 setae.

According to SEWELL (1947), the male described by WITH (1915) is not *P. sarsi* but belongs to a different species, *P. withi*.

The species has a wide geographical distribution in the deep waters of the North Atlantic (SARS, 1925), the coast of Ireland (FARRAN, 1908), the Banda Sea (A. SCOTT, 1909), the Arabian Sea (SEWELL, 1947), and the Izu region (TANAKA, 1958).

Pareuchaeta scaphula (FONTAINE, 1967)

(Fig. 3, T; Fig. 4, T)

Pareuchaeta tonsa, A. SCOTT, 1909, p. 72, pl. 14, figs. 8-15; SEWELL, 1947, p. 131, fig. 29, d, h, i; TANAKA, 1958, p. 365, fig. 80, a-i.

Euchaeta scaphula FONTAINE, 1967, p. 209, figs. 1-3, 6-9, 11, 12.

Occurrence: St. 83, 9♀; St. 84-2, 30♀, 4♂; St. 93-1, 13♀; St. 94, 6♀, 1♂; St. 95, 7♀, 1♂; St. 97-2, 27♀, 2♂; St. 98, 11♀, 1♂; St. 107, 3♀; St. 108, 31♀, 2♂; St. 109, 9♀, 2♂; St. 110, 3♀, 3♂; St. 111-1, 9♀, 1♂; St. 111-2, 2♀; St. 112, 2♀, 1♂; St. 113, 4♀, 1♂; St. 114, 8♀, 4♂; St. 115-1, 5♀, 1♂; St. 115-2, 4♀; St. 116, 2♀; St. 117-1, 2♀; St. 117-2, 1♀; St. 118, 2♀; St. 120, 1♀; St. 121-1, 7♀; St. 121-2, 6♀; St. 122, 8♀, 3♂.

Remarks: Female, 6.39-7.42 mm, male, 5.67-6.18 mm.

FONTAINE (1967) described two new species of *Euchaeta*, *E. pseudotonsa* and *E. scaphula*, separating from *P. tonsa* (GIESBRECHT) by the different structures found mainly in the genital segment of the female and the serrated lamella of the left 5th leg of the male. The three species have each different geographical distribution, and, as she pointed out, TANAKA's (1958) specimen obtained from the Izu region is *P. scaphula*.

In the female the genital segment in dorsal view appears slender anteriorly, with widest part near the posterior part of the segment: the genital aperture opens ventrally rather than posteriorly: genital swelling is more globose than in *P. tonsa* and *P. pseudotonsa*. The 1st maxilla has the outer lobe furnished with 7 long and 2 short setae. In the 1st leg the outer marginal spine on the 2nd segment of exopod reaches the distal margin of the 3rd segment. In the 2nd leg the 2nd marginal spine of the 3rd segment of the exopod exceeds the center of the 3rd marginal spine.

In the male the left 5th leg has a spiniform lamella on the 2nd segment of the exopod which is furnished on either side with teeth: the lamella reaches the center of the 3rd segment: the outer border of the lamella with 16 large teeth; the inner border with 3, sometimes 4, teeth on the spiniform end of the lamella: in posterior view a distinct spiniform process is found near the distal margin of the 2nd segment.

The species has been found in the Indian Ocean (SEWELL, 1947) and the East Malay Archipelago (A. SCOTT, 1909) as well as the Izu region (TANAKA, 1958) and Monterey Bay (FONTAINE, 1967). It is most common deep water species but is often found abundantly in the layers shallower than 200 m depth in the Izu region.

Pareuchaeta scotti (FARRAN, 1908)

(Fig. 3, U; Fig. 4, U)

Euchaeta scotti FARRAN, 1908, p. 42, pl. 3, figs. 11-13; WITH, 1915, p. 179, pl. 6, figs. 10, a-c, text-fig. 51, a-j.

Pareuchaeta scotti, SARS, 1925, p. 116, pl. 32, figs. 1-6; SEWELL, 1947, p. 125; TANAKA, 1958, p. 353, fig. 74, a-j.

Occurrence: St. 108, 1 ♀; St. 115-1, 1 ♀.

Remarks: Female, 4.89-4.94 mm. The genital segment has a dorso-lateral ridge when viewed from the left side. The 1st maxilla has 7 long and 2 short setae on the outer lobe.

The species has been recorded from the west of Greenland, Davis Strait to Baffin Bay (JESPERSEN, 1932), the west coast of Ireland (FARRAN, 1908), Gulf of Gascony (SARS, 1925), the Arabian Sea (SEWELL, 1947), off Peru and off southern Luzon (WILSON, 1950), and the Izu region (TANAKA, 1958).

Pareuchaeta simplex TANAKA, 1958

(Fig. 3, V; Fig. 4, V)

Euchaeta flava, MORI, 1937, p. 47, pl. 21, figs. 9-14, pl. 22, figs. 1, 2.

Pareuchaeta simplex TANAKA, 1958, p. 336, fig. 66, a-h.

Occurrence: St. 83, 6 ♀, 1 ♂; St. 84-2, 8 ♀, 4 ♂; St. 93-1, 4 ♀; St. 94, 2 ♀; St. 95, 4 ♀; St. 96, 4 ♀; St. 110, 1 ♀; St. 112, 1 ♀; St. 122, 1 ♀.

Remarks: Female, 3.00-3.81 mm; male, 2.94-3.00 mm.

P. simplex resembles *E. flava* described by GIESBRECHT (1892) from the South Pacific. Since GIESBRECHT no one has adequately described and figured the latter species. MORI's specimen reported under the name *E. flava* has the body length 3.73 mm in the female and 3.45 mm in the male. The spinulation of the 1st maxilla is just the same as in *P. russelli*.

The species has been recorded from the Formosan Strait, Chosen Strait, and off southeast coast of Japan (MORI, 1937). TANAKA (1958) found it in the Izu region.

Pareuchaeta simulantis sp. nov.

(Fig. 3, W; Fig. 4, W; Fig. 19, A-F)

Occurrence: St. 84-2, 4 ♀; St. 93-1, 1 ♀; St. 95, 1 ♀; St. 98, 1 ♀; St. 107, 1 ♀; St. 109, 1 ♀; St. 110, 1 ♀; St. 114, 3 ♀; St. 115-1, 4 ♀; St. 115-2, 1 ♀; St. 117-2, 1 ♀; St. 119, 1 ♀.

Descriptive notes: Female, 7.83-8.45 mm. The species is closely allied to *P. sarsi*. The cephalothorax and abdomen are in the proportional lengths as 71 to 29.

The rostrum is narrow, directing forwards and slightly downwards; the frontal prominence moderate.

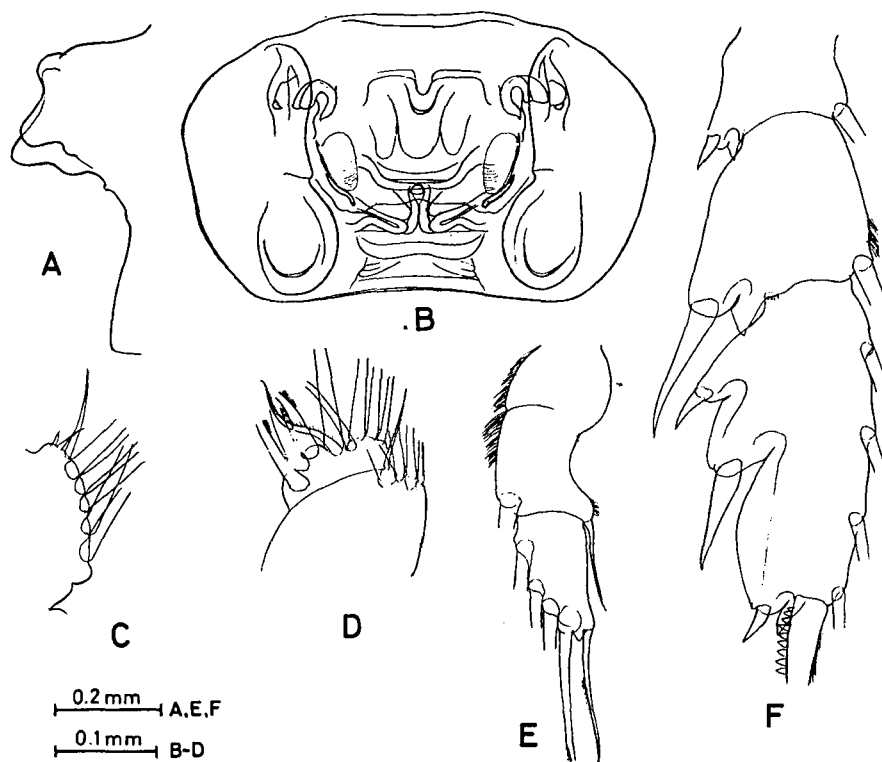


Fig. 19. *Pareuchaeta simulantis* sp. nov., female: A, genital segment, lateral view; B, genital aperture, ventral view; C, outer lobe of 1st maxilla; D, endopod and 2nd basal segment of 1st maxilla; E, exopod of 1st leg; F, exopod of 2nd leg.

The abdominal segments and furca are in the following proportional lengths:

segment	1-2	3	4	5	furca	
	46	22	19	2	11	=100

In lateral view the genital segment is quite similar in outline to that of *P. sarsi*; however, the genital aperture in ventral view is clearly different from that found in *P. sarsi*: in the genital aperture there is no distinct small ear-shaped swellings in the present species, although the swellings are distinct in *P. sarsi*: the plough-like swellings between the lateral flanges are feeble. The 3rd and 4th segments are furnished with fine long hairs.

The 1st antenna is about 6.0 mm in length: the segments have the following proportional lengths:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	65	39	26	24	26	28	28	33	21	22	27	39	38	47
16	17	18	19	20	21	22	23	24-25						
55	55	57	65	67	60	57	52	69	=1000					

The segments 1-15 are furnished with fine hairs on the posterior margin.

The 1st maxilla is provided with the following number of setae on the various parts: the outer lobe with 5 long, 1 short setae and 2 very minute ones; the endopod with 3+3+3 setae; the 2nd basal segment with 5 setae; the exopod with 11 setae; the 1st inner lobe with 13 setae; the 2nd and 3rd lobe with each a single seta.

In the 1st leg the 1st and 2nd segments of the exopod are fused: there is a minute spine on the region which corresponds to the distal end of the 1st segment. In the 2nd leg the outer marginal spine on the 2nd segment of the exopod is long, exceeding the distal end of the proximal spine of the 3rd segment: the 2nd outer marginal spine of the 3rd segment is rather short, reaching only the distal one-fourth of the outer margin between the bases of the 2nd and 3rd marginal spines.

Remarks: The present species comes nearest to *P. sarsi*, but is distinct from the latter species in its small size, slender rostrum, structure of the genital aperture, and also in the proportional lengths of the segments of the 1st antenna. The species has been recorded from Sagami Bay and its southern waters (present record).

? Pareuchaeta solida (ESTERLY, 1911)

(Fig. 20, A-D)

Euchaeta solida ESTERLY, 1911, p. 324, pl. 26, fig. 2, pl. 28, fig. 34, pl. 30, fig. 78.

Occurrence: St. 108, 1♂.

Descriptive note: Male, 6.90 mm. The cephalothorax and abdomen are in the proportional lengths as 70 to 30. The dorso-lateral tooth of the 5th thoracic segment is absent. The restrum is directed forwards and slightly downwards; the prominence of the frontal organ moderate.

The abdominal segments and furca are in the following proportional lengths:

segment	1	2	3	4	5	furca
	20	31	25	16	3	5
=100						

The 1st antenna is 4.8 mm in length: the segments are in the following proportional lengths:

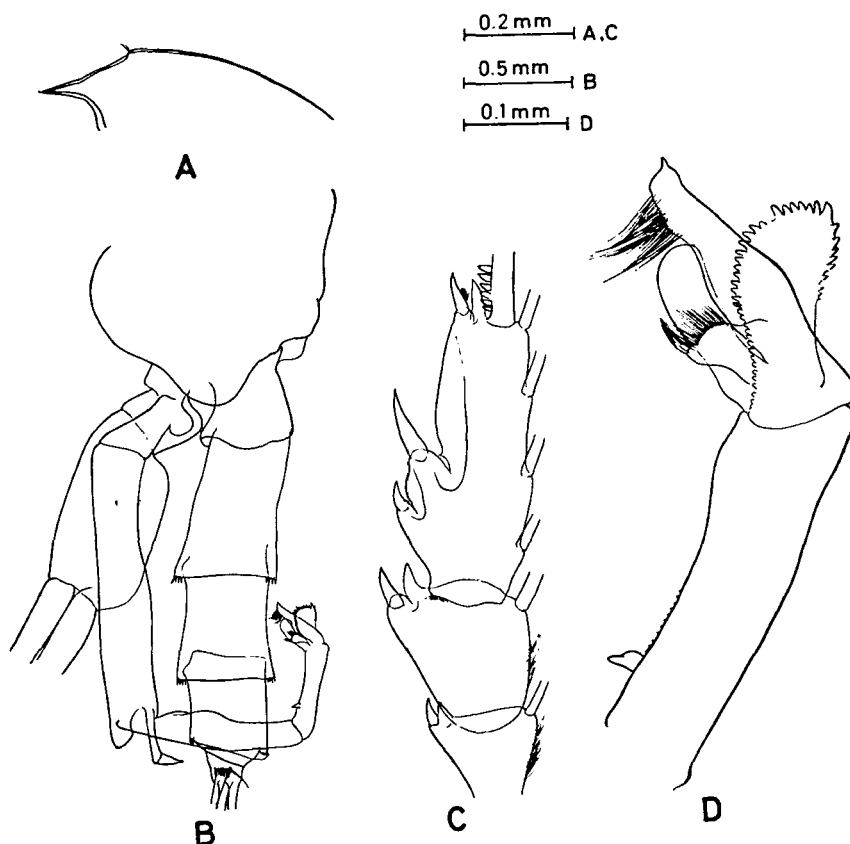


Fig. 20. ? *Pareuchaeta solida* (ESTERLY), male: A, head, lateral view; B, last thoracic segment and abdomen, lateral view; C, exopod of 2nd leg; D, clasper of left 5th leg.

segment	1	2	3	4	5	6	7	8-9-10	11	12-13	14	15	16
	72	37	33	25	29	33	33	72	23	43	43	47	49
17	18	19	20	21	22	23	24-25						
47	51	59	65	59	59	51	70	=1000					

In the left 5th leg the serrated lamella of the 2nd segment of the exopod is dilated distally and looks like a spoon: the teeth on the lamella is large in size: there are 9 teeth on the outer margin, 7 teeth on the distal margin, and about 30 teeth on the inner margin: the teeth on the inner margin diminish in size proximally.

Remarks: The present specimen is much larger in size than ESTERLY's *E. solida* measured 5.22 mm. According to ESTERLY (1911), the rostrum is directed downwards, and the serrated lamella of the left 5th leg is dentate only on the swollen part, whereas

in the present specimen the lamella is fringed with teeth along the inner margin to the region where the 3rd segment is inserted into the 2nd one. However, the specimen closely resembles *P. solida*. SEWELL (1929) stated that *P. solida* is the male of *E. tenuis* ESTERLY, but it is erroneous because the structure of the exopod of the left 5th leg is quite different.

Pareuchaeta striata sp. nov.

(Fig. 3, X; Fig. 4, X, Fig. 21, A-D)

Occurrence: St. 115-2, 3♀.

Descriptive notes: Female, 7.21-7.78 mm. The cephalothorax and abdomen are in the proportional lengths as 68 to 32; the cephalothorax elongate ovate. The rostrum is thick, directing forwards. The lateral distal margin of the thoracic segment is not uniformly rounded, but is narrow at the distal margin: it is furnished with a bunch of long hairs: the dorso-lateral margin of the segment slightly concave, and is fringed with short hairs.

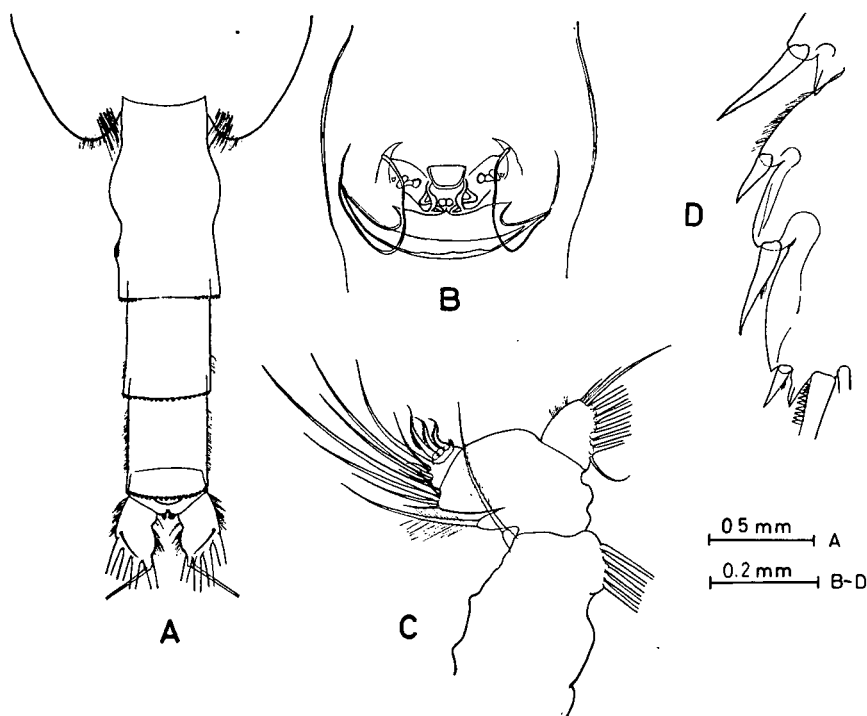


Fig. 21. *Pareuchaeta striata* sp. nov., female: A, last thoracic segment and abdomen, dorsal view; B, genital aperture, ventral view; C, 1st maxilla; D, distal part of exopod of 2nd leg.

The abdominal segments and furca are in the following proportional lengths:

segment	1-2	3	4	5	furca	
	44	22	20	3	11	=100

In dorsal view the genital segment is swollen laterally at the middle section: there is a slight process, which is finely striated at the apex, on the left side of the segment between the lateral swelling and the distal margin of the segment: in lateral view the lateral flanges of the genital aperture is rather small, and is flat in outline at the ventral margin: the posterior margin of the aperture forms a large process: the ventral distal margin of the segment is furnished with a small bunch of hairs. The 3rd segment is furnished with hairs on the distal half of the segment. The 4th segment is provided densely with short hairs. The anal segment is concealed beneath the foregoing, and is furnished with short hairs on the distal margin. The furcal rami are provided with hairs both on the outer and inner margins.

The 1st antenna is about 5.0 mm in length: the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8-9	10	11	12	13	14	15
	56	42	23	21	23	21	25	29	17	19	17	40	38	50
segment	16	17	18	19	20	21	22	23	24-25					
	63	65	67	73	71	65	58	54	63	=1000				

The segments 1-12 are provided each with fine hairs on the posterior margin.

In the 1st maxilla the outer lobe has 5 long setae: the endopod has 3+3+3 setae: the 2nd basal segment has 5 setae.

The 1st leg has a small outer marginal spine on the region where the 1st and 2nd segments of the exopod are fused. In the 2nd leg the outer marginal spine on the 2nd segment of the exopod scarcely reaches the base of the proximal spine on the 3rd segment: the 2nd outer marginal spine on the 3rd segment is short, hardly reaching the distal one-fourth of the 3rd division of the outer margin of the 3rd segment: the sinus at the base of the spine is shallow.

Remarks: The species is distinct from the other members of the genus by the characteristic structure of the genital aperture and the peculiar process on the left lateral margin of the genital segment.

Pareuchaeta withi SEWELL, 1947

(Fig. 22, A-E)

Pareuchaeta withi SEWELL, 1947, p. 131, fig. 30, a-c; OWRE and FOYO, 1967, p. 57, figs. 351-353.

Occurrence: St. 108, 1♂; St. 113, 1♂; St. 115-1, 2♂.

Remarks: Male, 8.36–8.45 mm. The cephalothorax and abdomen are in the proportional lengths as 70 to 30. The dorso-lateral tooth of the 5th thoracic segment is poorly developed. The rostrum is directed forwards.

The abdominal segments and furca are in the following proportional lengths:

segment	1	2	3	4	5	furca
	15	32	27	18	3	5 =100

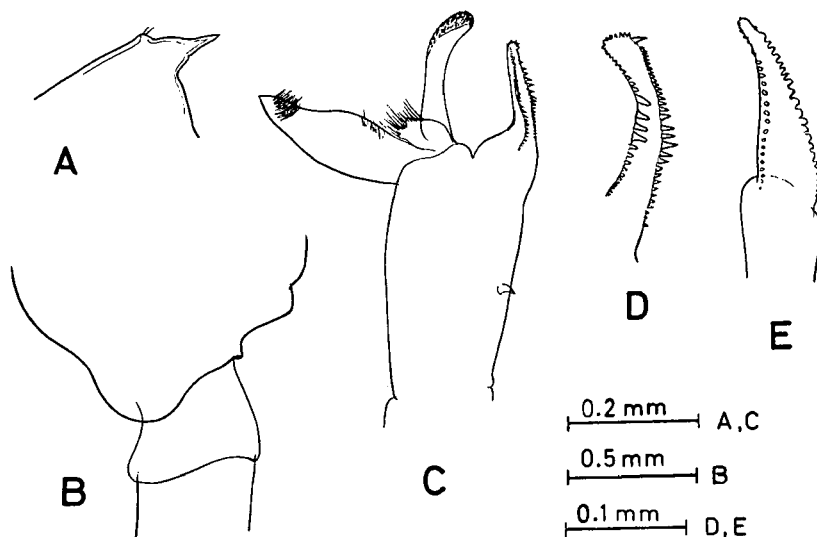


Fig. 22. *Pareuchaeta withi* SEWELL, male: A, head, lateral view; B, last thoracic segment and 1st abdominal segment, lateral view; C, clasping organ of left 5th leg; D and E, serrated lamella of clasping organ.

The 1st antenna is about 6.7 mm in length: the segments are in the following proportional lengths:

segment	1	2	3	4	5	6	7	8–9–10	11	12–13	14	15	16
	54	37	22	19	25	25	29	61	23	68	40	49	57
17	18	19	20	21	22	23	24–25						
	60	60	71	68	63	57	50	61					
													=1000

The clasping organ of the left 5th leg of the present specimens agrees quite well with that figured by SEWELL (1947): the organ resembles that of *P. barbata*, but can be distinguished from the latter by its slender form. The species was first described by WITH (1915) as the male of *P. sarsi*. However, it differs from *P. sarsi* in the shape of the lamella. The female of *P. withi* is not known as yet.

The species has been recorded from the North Atlantic (WITH, 1915), the Arabian

Sea (SEWELL, 1947), the Florida Current (OWRE and FOYO, 1967) and the Izu region (present record).

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Appendix-table. Plankton sampling data.

Station No.	Position	Date	Time	Sampling depth (m)
83	34°51.4' N 139°32.3' E	Oct. 23, 1964	1222-1450	0-1260
84-2	35°07.1' 139°16.8'	Oct. 25,	1552-1625	0- 740
93-1	34°54.3' 138°39.1'	Oct. 28,	1149-1224	0- 620
93-2	34°55.4' 138°38.7'	Oct. 28,	1228-1335	0-1300
94	34°30.0' 138°29.7'	Oct. 31,	1455-1603	0-1020
95	34°10.1' 139°29.0'	Oct. 31,	1809-1917	0-1120
96	33°50.3' 138°30.2'	Oct. 31,	2128-2159	0- 360
97-2	33°19.0' 138°32.1'	Nov. 1,	0409-0525	0- 800
98	33°00.3' 138°34.3'	Nov. 1,	0744-0904	0- 970
107	34°29.3' 138°35.5'	Mar. 4, 1965	1133-1427	0-2000
108	35°03.5' 139°19.3'	Apr. 23,	1212-1330	0-1000
109	34°55.4' 139°16.7'	Apr. 23,	1533-1657	0- 680
110	34°49.8' 139°30.2'	Apr. 23,	1907-2024	0-1440
111-1	34°30.7' 138°32.1'	Apr. 24,	1440-1556	0-1000
111-2	34°27.4' 138°34.2'	Apr. 24,	1605-1859	0-1430
112	33°57.5' 138°27.5'	Apr. 24,	2224-2343	0-1300
113	33°30.9' 138°32.8'	Apr. 25,	0257-0416	0- 520
114	33°01.2' 138°35.8'	Apr. 25,	0743-0900	0- 930
115-1	32°31.2' 138°37.9'	Apr. 25,	1225-1342	0- 921
115-2	32°28.8' 138°38.5'	Apr. 25,	1347-1639	0-2500
116	32°19.6' 139°31.5'	Apr. 25,	2118-2235	0-1200
117-1	32°30.6' 140°31.5'	Apr. 26,	0418-0539	0-1100
117-2	32°34.8' 140°37.0'	Apr. 26,	0544-0842	0-1560
118	33°02.5' 140°38.8'	Apr. 26,	1127-1240	0-1250
119	33°32.4' 140°31.8'	Apr. 26,	1546-1646	0- 730
120	34°02.2' 140°36.6'	Apr. 26,	1930-2049	0-1000
121-1	34°32.2' 140°32.5'	Apr. 26,	2358-0115	0- 850
121-2	34°34.2' 140°41.0'	Apr. 27,	0120-0420	0-1100
122	34°42.2' 139°58.4'	Apr. 27,	1019-1135	0- 900